



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Gordon Institute of Business Science

University of Pretoria

Beneficiation:

A competitive analysis of the South African mining industry

Carey Linnell

13380410

A research project submitted to the Gordon Institute of Business Science,
University of Pretoria, in partial fulfilment of the requirements for the degree of
Master of Business Administration

10 November 2014

Abstract

The aim of this research was to analyse the competitiveness of the South African mining industry in order to assess the viability of mineral beneficiation. This study also aimed to establish what was required in the mining industry in order to provide an environment which enables competitiveness going forward.

The Diamond Model of Industry Competitiveness developed by Michael Porter was utilised in analysing the mining industry's competitiveness. In the process of the analysis, the model was interrogated for validity in a developing and dynamic country via inference of the analysis of the South African mining industry. Based on the results of this research, a new model, built on the findings outlined by the Diamond Model, was developed.

The research found that the mining industry is not competitive at present and will not be able to provide an environment conducive to beneficiation in South Africa. Investigation further revealed that, as a result of the importance placed on the elements of the model, the Diamond Model is viable in a developing and dynamic environment. The results further provided sufficient feedback regarding how to utilise the elements from the Diamond Model in redesigning the competitive analysis in a forward-looking manner.

Keywords

'Mining', 'beneficiation', 'competitiveness', 'Porter's Diamond Model', 'South Africa'.

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted to any other university before for any degree or examination. I further declare that I have obtained the necessary authorisation and consent to carry out this study.

Carey Linnell

10 November, 2014

Acknowledgments

My dear family, I cannot express how much you mean to me and how much you have helped throughout this process and how much I owe this to you:

My father who, over the last two years, supported me, and spent hours discussing and enjoying each aspect of the process with me.

My mother who dealt with my stress and always provided unwavering support.

My brother who was patient with me and who has put up with my distractedness and continual absences from work.

My sister-in-law, Carolyn, whose pride and support was invaluable, and to Sam and Ian, my niece and nephew, who make my world a better place just by smiling.

To my supervisor, Solomon Moyo, you have been amazing throughout the process, providing invaluable guidance. You tenaciously asked the tough questions I could not answer until I was clear on what I was doing. You were always available to provide support. I could not have done this without you.

To my friends who were understanding and supportive, forgiving my being scarce, thank you. To the new friends I have met during the MBA, it has been an honour and a privilege and I hope our relationships last for many years to come.

Finally, I wish to thank the people who contributed to this endeavour. You participated in the interviews and provided open and honest information without expectation of anything in return. I hope that this research affords as much value to you as you provided me.

CONTENTS

Chapter 1 – Introduction	1
1.1 <i>Definition of Problem and Purpose.....</i>	1
1.2 <i>History</i>	2
1.3 <i>Current Environment</i>	4
1.4 <i>Context</i>	7
1.5 <i>Research Problem.....</i>	8
1.6 <i>Structure of this Research Report.....</i>	9
Chapter 2 – Literature Review	10
2.1 <i>Developing countries.....</i>	10
2.2 <i>Resource Endowment.....</i>	11
2.3 <i>Comparative Advantage.....</i>	13
2.4 <i>Globalisation</i>	14
2.5 <i>Industrialisation.....</i>	15
2.5.1 <i>Industrial Policy.....</i>	17
2.6 <i>Beneficiation.....</i>	17
2.7 <i>Competitiveness</i>	18
2.7.1 <i>The Diamond Model</i>	19
2.7.1.1 <i>Factor conditions.....</i>	21
2.7.1.1.1 <i>Infrastructure</i>	21
2.7.1.1.2 <i>Human Resources</i>	22
2.7.1.1.3 <i>Physical Resources</i>	22
2.7.1.1.4 <i>Capital Resources.....</i>	23
2.7.1.1.5 <i>Knowledge Resources</i>	23
2.7.1.1.6 <i>Related and supporting industries.....</i>	23
2.7.2 <i>Demand.....</i>	23
2.7.3 <i>Firm Strategy, Structure and Rivalry</i>	24
2.7.4 <i>Chance</i>	25
2.7.5 <i>Government.....</i>	26
Chapter 3 – Research Questions	27
3.1 <i>Introduction.....</i>	27

3.2	<i>Research Question One</i>	27
3.3	<i>Research Question Two</i>	27
3.4	<i>Research Question 3</i>	28
3.5	<i>Research Question Four</i>	28
Chapter 4 – Research Methodology		29
4.1	<i>Introduction</i>	29
4.2	<i>Research Design</i>	29
4.3	<i>Population and Unit of Measurement</i>	30
4.4	<i>Sample Size and Method</i>	30
4.5	<i>Research Method and Data Collection</i>	34
4.6	<i>Data Analysis</i>	36
4.7	<i>Anonymity</i>	36
4.8	<i>Reliability and Viability</i>	37
Chapter 5 –Results		38
5.1	<i>Introduction</i>	38
5.1.1	<i>Comparative Advantage</i>	38
5.1.2	<i>Industrialisation</i>	39
5.1.3	<i>Beneficiation</i>	40
5.2	<i>Diamond Analysis</i>	41
5.2.1	<i>Factor Conditions</i>	42
5.2.1.1	<i>Participants' Ratings</i>	42
5.2.1.2	<i>Interview Results</i>	44
5.2.1.2.1	<i>Infrastructure</i>	44
5.2.1.2.2	<i>Power</i>	45
5.2.1.2.3	<i>Road, Rail and Ports</i>	45
5.2.1.3	<i>Human Resources</i>	46
5.2.1.3.1	<i>Labour</i>	46
5.2.1.3.2	<i>Skills</i>	47
5.2.1.4	<i>Physical Resources</i>	47
5.2.1.5	<i>Capital Resources</i>	48
5.2.1.6	<i>Knowledge Resources</i>	49
5.2.1.7	<i>Summary of Factor Conditions</i>	50

5.2.2	Demand Conditions.....	50
5.2.2.1	Participants' Ratings.....	50
5.2.2.2	Interview Results.....	52
5.2.2.2.1	International Demand.....	52
5.2.2.2.2	Domestic Demand.....	52
5.2.2.3	Summary of Demand Conditions	53
5.2.3	Related and Supporting Industries.....	54
5.2.3.1	Participants' Ratings.....	54
5.2.3.2	Interview Results.....	55
5.2.3.2.1	Service Providers	55
5.2.3.2.2	Logistics Companies.....	55
5.2.3.3	Financial Environment.....	56
5.2.3.4	Summary of Related and Supporting Industries	56
5.2.4	Firm Strategy, Structure and Rivalry	57
5.2.4.1	Participants' ratings.....	57
5.2.4.2	Interview Results.....	58
5.2.4.3	Mining Companies.....	58
5.2.4.4	Mining Company Core Business and Beneficiation	60
5.2.4.5	Summary of Firm Strategy, Structure and Rivalry	61
5.2.5	Chance/Resilience.....	61
5.2.5.1	Participants' ratings.....	61
5.2.5.2	Interview Results.....	62
5.2.5.3	Summary of Chance/Resilience.....	64
5.2.6	Government.....	64
5.2.6.1	Participants' Ratings.....	64
5.2.6.2	Interview Results.....	65
5.2.6.3	Summary of Government.....	66
5.3	<i>Summary of Results</i>	67
Chapter 6 – Discussion of Results		69
6.1	<i>Introduction</i>	69
6.2	<i>Context</i>	69
6.2.1	Resource Endowment and Comparative Advantage	70
6.2.2	Globalisation	70
6.2.3	Industrialisation and Industrial Policy	70
6.2.4	Beneficiation	71
6.3	<i>Competitiveness Analysis</i>	72

6.3.1	Factor Conditions	72
6.3.1.1	Infrastructure	73
6.3.1.1.1	Power	73
6.3.1.1.2	Transport	74
6.3.1.2	Human Resources.....	74
6.3.1.2.1	Skills	74
6.3.1.2.2	Labour.....	74
6.3.1.3	Physical Resources	75
6.3.1.4	Capital Resources	75
6.3.1.5	Knowledge Resources	75
6.3.2	Demand Conditions.....	76
6.3.3	Related and supporting industry.....	77
6.3.4	Firm Strategy, Structure and Rivalry	79
6.3.4	Government.....	80
6.3.5	Chance	82
6.4	<i>Research Question One</i>	83
6.5	<i>Research Question Two</i>	83
6.6	<i>Research Question Three – The Relevance of Porter's Model</i>	84
6.7	<i>Research Question Four - Redesigning the Diamond Model</i>	85
6.7.1	Base Ingredients.....	86
6.7.2	Surrounding Environment.....	86
6.7.3	The Next Step.....	86
6.7.4	Enabling Environment.....	87
Chapter 7 - Conclusion.....		88
7.1	<i>The Research</i>	88
7.2	<i>Main Findings</i>	88
7.2.1	Research Question One	89
7.2.2	Research Question Two	89
7.2.3	Research Question Three.....	89
7.2.4	Research Question Four.....	89
7.3	<i>Significance</i>	90
7.3.1	Business	90
7.3.2	Academia	90
7.4	<i>Research Limitations</i>	91

7.5	<i>Future Study</i>	92
7.6	<i>Conclusion</i>	93

FIGURES

<i>Figure 1 : The Four Stages of Beneficiation</i>	7
<i>Figure 2 : Seven Dimensions of Value</i>	8
<i>Figure 3 : Porter's Diamond Model</i>	20
<i>Figure 4 : Beneficiation Process Interview Structure</i>	31
<i>Figure 5 : Interview Participants and Industry Representation</i>	32
<i>Figure 6 : Participants Interviewed</i>	33
<i>Figure 7 : The Four Stages of Beneficiation</i>	40
<i>Figure 8 : Current Competitiveness - Factor Conditions</i>	42
<i>Figure 9 : Level of Importance - Factor Conditions</i>	43
<i>Figure 10 : Current Competitiveness - Demand Conditions</i>	50
<i>Figure 11 ; Level of Importance - Demand Conditions</i>	51
<i>Figure 12 : Current Competitiveness- Related and Supporting Industries</i>	54
<i>Figure 13 : Level of Importance - Related and Supporting Industries</i>	55
<i>Figure 14 : Current Competitiveness: Firm Strategy, Structure and Rivalry</i>	57
<i>Figure 15 : Level of Importance - Firm Strategy, Structure and Rivalry</i>	58
<i>Figure 16 : Current Competitiveness - Chance</i>	61
<i>Figure 17 : Level of Importance - Chance</i>	62
<i>Figure 18 : Current Competitiveness - Government</i>	64
<i>Figure 19 : Level of Importance - Government</i>	65
<i>Figure 20 : Current Competitiveness Summary</i>	67
<i>Figure 21 : Levels of Importance Summary</i>	68
<i>Figure 22 : Current Competitiveness - Factor Conditions</i>	72
<i>Figure 23 : Level of Importance - Factor Conditions</i>	73
<i>Figure 24 : Current Competitiveness - Demand Conditions</i>	76
<i>Figure 25 : Level of Importance - Demand Conditions</i>	76
<i>Figure 26 : Current Competitiveness - Related and Supporting Industries</i>	77
<i>Figure 27 : Level of Importance - Related and Supporting Industries</i>	78
<i>Figure 28 : Current Competitiveness - Firm Strategy, Structure and Rivalry</i>	79
<i>Figure 29 : Level of Importance - Firm Strategy, Structure and Rivalry</i>	79
<i>Figure 30 : Current Competitiveness - Government</i>	80
<i>Figure 31 : Level of Importance - Government</i>	81
<i>Figure 32 : Current Competitiveness - Chance</i>	82
<i>Figure 33 : Level of Importance - Chance</i>	82
<i>Figure 34 : Adapted Porter Diamond</i>	85

TABLES

<i>Table 1 : Research Question One Results</i>	83
<i>Table 2 : Research Question Two Results</i>	84

Chapter 1 – Introduction

“It is the maxim of every prudent master of a family never to attempt to make at home what it will cost him more to make than to buy. The tailor does not attempt to make his own shoes, but buys them from the shoemaker. The shoemaker does not attempt to make his own clothes, but employs a tailor. The farmer attempts to make neither the one nor the other, but employs those different artificers. All of them find it in their interests to employ their whole industry in a way in which they have some advantage over their neighbours, and to purchase, with a part of its produce, or what is the same thing, with the price of a part of it, whatever else they have occasion for.” Adam Smith – The Wealth of Nations (1776, IV: 2 - 11).

1.1 Definition of Problem and Purpose

The mining industry in South Africa has been a key contributor to the South African economy, but is in a state of flux due to industrialisation plans being put forward and implemented by the South African government. The South African government has identified the mining industry as a key focus area in their plans. More specifically, their key interest is in beneficiation/value addition of minerals in the country. In order for beneficiation to be practical, there needs to be a market for the material, and, in order to access these markets, the materials being sold need to be competitive with competitor's products.

With globalisation, the importance of competitiveness is more significant than ever. Simply put, beneficiation needs to be competitive or it will not be successful. South Africa has to compete with countries and markets who have varying advantages and disadvantages. As a result, markets should be chosen based on where demand will be satisfied and in places where the country has a competitive lead over others.

The South African Chamber of Mines released an overview revealing the fact that, as a result of realigning expectation over the 2013/2014 period, the top 40 South African companies confessed to a lack of confidence in the South Africa mining industry. This lack of confidence has had a direct impact on the South African mining industry's competitiveness.

In response to the economic downturn in 2008, the South African Government adopted The New Growth Path (NGP) as the framework for the country's economic policy and the driver of the country's employment strategy (Economic Development Department,

2011). One of the sectors identified as a priority for employment creation was the mining value chain. The government has since put together a beneficiation strategy in order to promote the beneficiation of raw materials to increase the value addition for local consumption and export (Department of Minerals Resources, 2011).

In order to analyse the success factors for beneficiation in South Africa, this research analyses the competitiveness of the mining industry. In investigating the mining industry, which provides the inputs into mineral beneficiation, it can be established whether beneficiated material may be competitive internationally. Michael Porter (2011), in his book 'The Competitiveness of Nations', states that, in order for a country to be competitive, there needs to be competitive industries within them. As a result, he utilised industry competitiveness as his unit of analysis in creating the Diamond Model to analyse industry competitiveness. In an analysis of Porter's book, Grant (2011) stated that he integrated and broadened contemporary theory of international trade, alluding specifically to Porter's reference to spacial aspects of strategy. This is evident in the industry cluster which forms a core part of the Diamond Model.

This research will utilise the Diamond Model to structure the analysis of the competitiveness of the mining industry in South Africa.

Porter (2011) identified four core elements present in a mutually reinforcing system with two additional elements that are influencers:

Core elements:

- The Firm strategy, structure and rivalry;
- Demand conditions;
- Related and supporting industries;
- Factor conditions.

Influencing elements

- Government;
- Chance.

1.2 History

During the 1990s and post-apartheid, the economy shifted from being an exporter of predominantly raw material to becoming that of an exporter of manufactured and

processed goods (Cawood & Oshokoya, 2013). This transition was a result of the construction of a number of large-scale, resource-based investment projects such as Columbus Stainless (stainless steel), Hillside Aluminium (aluminium), Namakwa Sands (mineral sands) and Saldanha Steel (steel).

Post-apartheid, the South African government launched a number of programmes focused on incentivising industrialisation. For instance, the National Industrial Participation Programme (NIPP) was put in place to ensure that large foreign purchases by state entities secure off-setting investment obligations within the domestic economy.

In addition to the aforementioned, substantial sectorial support measures were put in place for two main sectors in particular, namely, the motor industry and clothing and textile enterprises. The Motor Industry Development Programme (MIDP), aimed at facilitating automotive development, was implemented in 1995; and the Duty Credit Certificate Scheme (DCCS) was instituted on 1 April 1993 to encourage growth in the clothing and textiles arena.

Substantiating this drive towards industrialisation is the fact that new incentives, raising overall levels of manufacturing investment were introduced. Some of these were:

- The Tax Holiday Scheme (THS);
- The Small and Medium Manufacturing Development Programme (SMMDP);
- The Small and Medium Enterprise Development Programme (SMEDP);
- The Strategic Industrial Projects (SIP).

(The Department of Trade and Industry, 2014)

These incentives enabled industrialisation in South Africa. The current government is planning the same, relying on the growth of beneficiation and manufacturing in order to drive its growth plans.

The world economy has changed in significant ways during the past several decades, especially in the areas of international trade and industrial organisation. Two of the most important new features of the contemporary economy are: the globalisation of production and trade, which has fuelled the growth of industrial capabilities in a wide range of developing countries; and the vertical disintegration of transnational corporations (Gereffi, Humphrey, & Sturgeon, 2005).

As a result of globalisation, geographically dispersed activities have become functionally integrated and organised into complex transnational production networks (Dicken, 1998; Gereffi, 1994). Now known as global value chains (GVCs), they link the different value-added stages, which are composed of many activities, that are required to bring a product from conception and design to the final consumer and, finally, to its disposal (Kaplinsky and Morris, 2001). These global value chains mean that the same company/country no longer needs to participate in all areas of a product's value addition. For example, in the context of minerals, the same country that mines the raw material does not need to be directly involved in the production thereof. They often cannot compete with countries with more cost effective factor conditions. Globalisation has not only increased competition significantly, but changed the dynamics of what is economically viable in an industrialising economy.

Globalisation is either seen as accelerating the participation of developing countries in the world economy, thereby having a positive impact on industrialisation and income levels; or as a phenomenon increasing inequality and leading to major stress being placed on workers. The environment growth potential for Africa's manufacturing industries is critically constrained by: high uncertainty and risks, which reduce firms' propensity to undertake capital investment; and by significant entry barriers to export markets (United Nations Economic Commission for Africa, 2013).

1.3 Current Environment

The South African Government is in the process of putting together a detailed beneficiation strategy and these plans have the potential to fundamentally change the mining industry in South Africa. However, a formal plan as a follow on from this strategy had not been released as at the time of this research, and there is as yet no formal agreement between industry and government on how it should be structured and what should be included.

There are a significant number of policies, strategies and plans currently affecting beneficiation within the mining industry, whether by direct inclusion or input into the surrounding environment. These include, but are not limited to, the following main components:

- National Development Plan (NDP);
- National Industrial Policy Framework (NIPF);
- Industrial Policy Action Plan (IPAP5);

- Presidential Infrastructure Coordinating Commission (PICC);
- Mineral and Petroleum Resources Development Act, 2002 (MRPDA);
- Mineral and Petroleum Resources Development Act, 2008 (Act No. 49 of 2008) (MRPDA Amendment Bill);
- Broad-Based Socio-economic Empowerment Charter for the Mining Industry (BBSEE -Mining Charter, as amended 2010);
- Precious Metals Act, 2005 (PMA);
- Income Tax Act;
- Manufacturing Investment Programme (MIP);
- Increased Funding to the IDC;
- Medium Term Strategic Framework (MTSF).

(The Department of Trade and Industry, 2007; Economic Development Department, 2011; The Department of Trade and Industry, 2014; Thomashausen, 2011).

With such a large number of policies, plans and incentives, there needs to be a significant amount of inter-ministerial co-operation and planning. Conflicting and ambiguous messages have had an adverse effect on industry with regard to confidence and successful implementation. This has raised concerns within the mining industry due to the lack of involvement as well as an inherent ambiguity with regard to proposed bills, strategies and policies. These concerns will be addressed in this research.

The South African Department of Minerals and Energy proposed an amendment to the current mineral bill, which had provisions including proposals to secure certain minerals at 'developmental' prices for beneficiation, to restrict the export of minerals classified by the minister as 'strategic'. This empowered the minister to use his own discretion in determining what percentage of specified minerals should be made available to local beneficiators, as well as affording him the authority to specify the minerals to which this is applicable. (Bello, 2014)

These detailed provisions stipulate that – in order to regulate the mining industry, meet national development imperatives and bring optimal benefit to South Africa – the minister must initiate or promote the beneficiation of mineral resources in South Africa (Tucker & Sibisi, 2014). In 2012, an amendment bill was approved by parliament with provisions including the one above contested by industry (McKay, 2014).

Significantly, in June 2014, the new South African Minister of Mines, Minister Ngoako Ramatlodi, despite parliamentary approval, halted the process and requested that the

President not sign the Mineral and Petroleum Resources Development Amendment Bill of 2013 (McKay, 2014). This facilitated further discussion on the details of the bill before final approval. This action, in turn, promoted further dialogue.

The government has identified the following value chains in the current beneficiation strategy:

- Energy commodities/coal;
- Iron and steel;
- Pigment and titanium metal;
- Autocatalytic convertors and diesel particulate;
- Jewellery fabrication.

(Department of Minerals Resources, 2011).

The South African Government has acknowledged that there will be challenges in fulfilling the beneficiation strategy. Minister Rob Davies from the Department of Trade and Industry said that he does not suggest that beneficiation is easy; however, he believes that if South Africa does not decisively pursue beneficiation, the South African economy will be relegated to a place at the bottom end of the globalisation of labour, with serious consequences to the industry's ability to generate income and employment (Greve, 2014).

Should government go ahead with putting the amendments and beneficiation strategy in place, there is an alternative view that a downside of forced or poorly designed beneficiation is that it risks subsidising downstream inefficiency which could deter investment. It is key that all role players work together to carefully identify competitive advantages as part of a broader set of discussions on economic feasibility (Bello, 2014). In the case of this research, with regard to mineral beneficiation, the role players are the mining and manufacturing industries and government.

It is important to note that the drive for industrialisation and natural resource beneficiation is larger than just South Africa and extends to other resource-rich neighbouring countries in the South African Development Community (SADC). At the SADC summit on 17 August 2014, it was asserted that the goal to drive short- and long-term growth in the region would only be realised if the region benefited its minerals (Dickson, 2014).

1.4 Context

Economic theory dictates that once a mineral resource is mined, that resource is consumed and therefore gone for good. By that rationale, as these resources are not infinite, there is only one avenue through which to make the most of them (Cawood, 2011). Beneficiation increases the value of the material, allowing for optimal benefit as much as possible from its extraction, the resource often requires value addition.

Beneficiation, is described by Cawood (2011) as, “Starting with a particular orebody with unique economic characteristics such as shape, size, quality, and distance to markets”. The orebody is of little value in the ground and, for it to become valuable, it must: be accessed (developed); be removed from the host rock in which it occurs (mined); have the valuable part separated from the ore after mining (crushing, processing, smelting, and refining), and; finally, be moved to the market place where a transaction may occur (transported). This lengthy process requires investment in the form of capital and working costs, and it may take many years of exploration and development, and incur sunk costs, before the final production can be exchanged for money.

When this conversion eventually occurs, there is no guarantee that the mining company will make a return that justifies the risks taken. The industry is, therefore, particularly uncertain, requiring governments to understand the need for stability of terms, security of tenure, and protection against expropriation. Once the investment is made, the capital is captive, leaving companies at the mercy of governments.

Figure 1 : The Four Stages of Beneficiation

STAGE	MINERAL BENEFICIATION PROCESS CATEGORY	PROCESS FLOW-CHART	LABOR INTENSITY	CAPITAL INTENSITY	INDUSTRY CLUSTER
1	The action of mining and producing an ore or concentrate (primary product)	Run of mine ores → Washed and sized concentrates	HIGH	HIGH	MINING
2	The action of converting a concentrate into a bulk tonnage intermediate product (such as a metal or alloy)	Mattes/slugs/ Bulk chemicals → Ferro alloys/ pure metals	LOW	HIGH	MINING
3	The action of converting the intermediate goods into a refined product suitable for purchase by both small & sophisticated industries (semis)	Steel/alloys → Worked shapes and forms	LOW	HIGH	REFINING / MANUFACTURING
4	The action of manufacturing a final product for sale	Worked shapes and forms → Worked shapes and forms	MEDIUM TO HIGH	MEDIUM TO HIGH	MANUFACTURING

(Source: Adapted from 'The Chamber of Mines South Africa').

It is important to note that the process in Figure 1 falls within the mining industry and stops short of manufacturing. In the context of this research, manufacturing falls into a different category and is included to provide insight into the perspective local demand for beneficiated material only.

In order to understand the value of the mining industry, outside of pure mining and material supply, the spin-off and multiplier effects need to be taken into account as a result of direct mining. The World Economic Forum created a mineral value management tool that provides an understanding and a means by which to encourage further investigation. This identifies seven distinct drivers of value as a result of direct mining as represented in Figure 2. While there is a drive to beneficiate, it must be noted that the mining industry is not in isolation and affects many surrounding industries and communities. Therefore beneficiation strategies that could constrain mining need to take into account value, such as that illustrated in Figure 2, in order to minimise losses.

Figure 2 : Seven Dimensions of Value



(Source: World Economic Forum – Responsible Mining Development Initiative).

1.5 Research Problem

Current research has predominantly analysed competitiveness at a point in time and a historical perspective and is often performed on countries in various stages of industrialisation. Possession of mineral wealth does not necessarily translate directly into

a competitive advantage that is immediately capitalised on in downstream industry as other factors are at play in limiting this growth (Patrick, 2014). As such, analysing competitiveness in the mining industry will be able to provide insight into whether beneficiation will be competitive enough to succeed.

The research will utilise Porter's Diamond Model (Porter, 2011), and, in doing so, will analyse its relevance to the South African environment and which aspects of his model may require amendment or the design of a new model entirely. The research also aims to analyse an industry in transition, from the current status of the mining industry in relation to competitiveness and the resultant readiness for beneficiation, as well as what is required to achieve this competitiveness going forward. The intention of this research is to analyse the industry not only through Porter's Diamond Model, but also to analyse Porter's Diamond Model through the results of its efficacy in the industry.

1.6 Structure of this Research Report

This dissertation has been divided into seven chapters. Chapter one is an outline of the current relevance and context of the research as well as an introduction to the theory used as the base for analysis. Chapter two provides a literature review that highlights the key issues that are of relevance to each aspect of the research. It includes literature regarding the environment in order to provide context as well as expounding on theory specific to the Diamond Model. The review includes the following:

- What a developing country means and how South Africa attained that classification;
- Reliance on natural resources;
- Globalisation;
- Industrialisation as a strategy for growth of developing countries;
- Beneficiation;
- Porter's Diamond Model.

Chapter three outlines the research questions that arose from both the literature and those arrived at during the process of the research. Chapter four details the methodology used in the study, followed by chapter five in which the results of the research will be presented. Chapter six provides an analysis and discussion of the results. Following this, chapter seven offers and expounds on suggestions for further research as well as outlining any additional findings.

Chapter 2 – Literature Review

This chapter looks at the literature that covers areas of relevance that make up the basis and key areas for this research. The flow of the review identifies literature that provides background and history as to why South Africa is natural resource intensive. In this regard, the literature is broken up into the history of developing countries, resource endowment and comparative advantage. The discussion then looks at literature on industrialisation, of which beneficiation forms an integral part; and competitiveness, which is the overarching requirement for success in moving forward with beneficiation. The main theory used as an outline for competitiveness will be Michael Porter's Diamond Model which is used to analyse the competitiveness of an industry (Porter, 2011).

2.1 Developing countries

Based on the World Bank definition, South Africa is categorised as being a developing country. Developing countries originated from being categorised as 'third world'. Towards the end of the Cold War, these countries showed differences in growth trajectories, and, as a result, attracted interest from wealthier nations (The World Bank, 2012).

The terms 'developed and 'developing nations' were coined after the Second World War with the onset of de-colonisation. During this period of de-colonisation, wealthier nations saw an opportunity to extend ideological and economical influence over developing nations. The intensity of the interest varied based on the usefulness of the factor endowments in each respective country (Desai & Potter, 2013). South Africa's superlative factor endowments attracted significant interest, which played a role in structure of the mining of the mining industry during that time.

The classification of a country as 'developed' or 'developing' has a significant impact on the development assistance, trade preferences, climate change commitments and international treaties (Pauwelyn, 2013). At the time of this research, South Africa was classified as a developing country. In order to move to a developed status, industrialisation is quintessential. This process facilitates in developing and growing the economy.

The countries that fall into the category of 'developing' are classified as such according to the World Bank definition. This is based on the country's defined gross national income per capita parameters and countries where the majority lives on far less money, with fewer basic services than the population in highly industrialised countries (The World

Bank, 2012). The inference from this definition is that, in order to achieve developed status as well as exhibit economic growth, developing countries need to address their levels of sustainable industrialisation. Long-term sustainable and inclusive growth is the driving force in poverty reduction in developing countries and in enabling convergence with developed countries (Lin, 2013). South Africa's industrialisation plans, as outlined in the industrial policy action plan, include beneficiation and manufacturing as key elements to the country's growth (Department of Trade and Industry, 2007).

The factor endowments that more often than not attracted these wealthier nations to developing countries were natural resources. These endowments and the resultant demand for them have, in a number of cases, been a hindrance to growth (Mavrotas, Murshed, & Torres, 2011).

2.2 Resource Endowment

The concept of resource abundance inhibiting a country's growth rather than developing it was raised by a widely quoted article by Sachs and Warner (2001). They called this phenomenon the 'resource curse'. The utilisation of the term 'curse' reflected their conclusion that resource abundance, measured as a ratio of primary commodities' exports to gross domestic product (GDP), was negatively correlated with GDP growth (Morris, Kaplinsky, & Kaplan, 2012). This often led to revenues and production that were concentrated in single or small numbers of commodity exports (Mavrotas et al., 2011).

Volatility in pricing and market conditions, such as resource booms, in these commodities causes an appreciation of the real exchange rate. This, in turn, reduces the competitiveness of domestic exports and depresses other sectors of the economy, particularly manufacturing, which is crucial to generate technological progress, and hence drive economic growth. Alternatively, this can be identified as an increase in the price of non-tradables, which reduces the international competitiveness of domestic exporters (Botlhole, Asafu-Adjaye, & Carmignani, 2012).

This resource curse is identified by Kellman and Shachmurove (2011) as the explanation for developing countries' inability to diversify their industries and exports. This focus on the development of primarily raw material exports leads to less motivation for alternate export developments inhibiting any form of industrialisation (Gan, Zhang, Liang, Zhao, & Li, 2013). The result is weak economic complexity limiting cross-industry knowledge spillovers that can benefit a country's export activity (Bournakis, 2014). A solution to this is

to add value to materials in these countries, resulting in a greater degree export of specialisation rather than then export of pure raw materials (Gan et al., 2013).

An alternate, but similar theory, that of the 'concentration curse', warns against the economy being reliant on a small concentration of industries that can crowd out new and alternate industries (Cadot, Carrère, & Strauss-Kahn, 2013). Kellman and Shachmurove (2011) also warn that over-specialisation is often a major cause of failure in less developed countries' inability to reach and compete with specialisation that is being achieved by the developed world. In this regard, the focus of this study is on raw material exports and limited beneficiation.

This industrial competition between the developed and developing world is not always a potential for failure, Lin (2012a) identified in his article 'From Flying Geese To Leading Dragons: New Opportunities and Strategies for Structural Transformation in Developing Countries', that, if managed correctly, there can be great success by following the accomplishments in similar industries in the developing world, and by learning from their successes and failures. Japan is an example of this in respect to their industrialisation after World War 2. Japan's electronic industry was grown based on technology and products from other countries and that they then improved on (Porter, 2011).

In order to affect growth, capital accumulation is a key requirement. Natural resource booms assist with capital formation that can be used for the purpose of funding value-adding activities. The economy may either shift away from or increasingly depend on natural resources so that different industrial trajectories take place. Accordingly, different development paths ensue, and, if used for the incorrect purposes, natural resource-led poverty traps emerge (A. Botta, 2010). If a country relies heavily on raw materials and does not plan for any form of structural change to diversify the growth – through a boom or bust cycle or if there is some existing failure in the economy that is intensified by the mineral boom that country – they inhibit the appropriate structural adjustments. (G. Davis & A. Vásquez Cordano, 2013). South Africa's growth trajectory has, historically, been based significantly on the mining industry and highly reliant on the export of natural resources. So, with current fund shortages accelerating growth, a poverty gap, as mentioned by Alberto Botta (2010), has the potential to become more pronounced.

The over-development of raw material exports leads to less motivation for improving resource productivity, as demonstrated by high income level resource-exporting countries with low resource productivity. Therefore, high proportion raw material-exporting countries need to concentrate on increasing the efficiency of their resource

extraction and manufacturing. Meanwhile, native manufacturing industries should be encouraged, thus promoting enhanced resource productivity (Gan et al., 2013). The promotion of highly resource-efficient fields in economic structures is useful in improving resource productivity rather than that of pure primary exports. This is achieved through technological advancement as well as appropriate economic and policy guidance (Gan et al., 2013).

However, the resource curse is not inevitable in Africa. In Botswana, for example, in the context of political legitimacy and comparatively sound economic management, the export of diamonds has financed rapid development. By the same token, the curse is not confined to Africa (McFerson, 2010). McFerson (2010) further stated that the major explanation for the materialisation of the resource curse is political. An example of this is the concept of rent. The concept of 'rent' first evolved in relation to oil-rich states in the Middle East and was then applied to African countries with substantial mineral resources. Rents can be defined as the reward for ownership or control of mineral resources (which are extracted rather than produced). These revenues are received by the government, having taken no part in the costs of the marketing extraction and other mining costs which are borne purely by the company. This can damage business and government through corruption and diversion of human capital. Similarly, some argue that government policy can become unfocused, or incorrectly focussed, and unmotivated in tackling difficult growth-promoting policies (Rogers, 2003).

2.3 Comparative Advantage

There are a number of views that define comparative advantage. For the most part, a country is said to have a comparative advantage in commodities when it can produce more products, or is more productive, than other countries. This may be a view that is too simplified in a globalised world as it does not take into account impediments to trade, production costs, transport costs, market trends and volatile commodity pricing. Thus, Maneschi (1998) takes these issues into account and refines the definition of a country's comparative advantage to include post-trade costs in the assessment of these costs. In assessing these costs, analysts agree that it is not only the primary upgrade costs that affect industrialisation's success, but the broader cost base (Deardorff, 2014; Zhang & London, 2013). Porter (2011) utilises the latter inclusion of a broader cost base when analysing industries' and nations' competitiveness. Based on the structure of the Diamond Model which he presented in his book, 'The Competitive Advantage of Nations',

comparative advantage is only one aspect of successful competitiveness in industries and therefore nations.

Comparative advantage can take a number of forms. However, with regard to South Africa's natural resources, comparative advantage derives from immobile resources such as minerals (Coxhead & Jayasuriya, 2010). Although this may seem to provide a competitive advantage in relation to surrounding countries, in a global economy, pure immobile resource comparative advantage is not enough of a differentiator to be competitive. Porter (2011) agrees with this, stating that comparative advantage – which rests on endowments of inputs such as labour, natural resources and capital – has become less and less important with regard to competitiveness.

Various recommendations have been made to develop industries further down the value chain away from pure comparative advantage. Export specialisation in production and exports, determined by a country's comparative advantage, has been discussed in literature. However, arguments have also been made that this may not be appropriate as a long-term solution (Alwang & Siegel, 1994). Amurgo-Pacheco (2008) agreed with export diversification rather than specialisation, as, in the case of developing countries, the products that are being concentrated are often commodities with volatile demand. This then results in high income and growth volatility. Naudé, Bosker, and Matthee (2010) also agree with export diversification but for a different reason: their argument for this is based on endogenous growth theory and calls for the diversification of exports from primary commodities through value addition, as trade in these products may result in more positive spill-over onto other sectors as well as having potential multiplication effects.

2.4 Globalisation

The end of apartheid in South Africa can be regarded as a triple transition: political, economic and social. Along with these transitions, which influenced the South African economy, the country was exposed to a macrocosmic influence, that of globalisation (Smet, 2013)

Globalisation has been one of the biggest reasons for transformation of a country's use and management of comparative advantages. Comparative advantages now have to be developed into competitive products not just on a local level but also in the international arena. There is no defined definition of globalisation, however, Morrissey and Filatotchev (2000) describe it as an increase in globalism, comprising networks of countries who

are inter-dependent at multi-continental distances. Many developing countries have benefited from increased global integration. However, there are still many that have not taken, or been able to take, sufficient advantage of it (Chandra, 2004).

In order to increase growth through effective utilisation of both comparative advantages and globalisation, development and industrial strategies are developed and implemented in developing countries. In South Africa, this can be seen from the multiple strategies, policies, plans, acts and laws that focus on ensuring this effective utilisation of resources for the development and upliftment of the country and its economy ('South Africa: investor's handbook 2013/2014', 2014). These plans for development require various forms of industrialisation. Trade facilitation, for example, is any policy that reduces the transaction costs of international trade.(Dennis & Shepherd, 2011) Depending on the extent that it does so, it interferes proportionally with the free-market mechanisms, thereby affecting the allocation of resources by introducing distortions in them. For some purists, this is regarded as wholly negative because they consider virtually all government-induced distortions to be unnecessary, deeming these negative deviations from the best scenario or outcome that would, they assert, result from free market operation.

2.5 Industrialisation

Industrialisation can be described as a form of structural change resulting in a change of the makeup of an economy (Vera, 2013). Great Britain was the first country to industrialise in the nineteenth century, and the British concomitantly became the technological leader in the world economy, with manufacturing becoming the main engine of accelerating economic growth.

Industrialisation should be seen as a single global process facilitating structural change in which individual countries follow different paths depending on their initial conditions and their moment of entry into the race. The first countries to follow Britain's example and implement industrialisation were European countries, namely Belgium, Switzerland and France and the like. In the nineteenth century, the United States followed a different path towards industrialisation based on primary exports, the abundance of land and natural resources, and scarcity of labour. Famous latecomers to the process of industrialisation were Germany, Russia and Japan (Szirmai, 2012).

Industrialisation and structural change require many forms of upgrading. Hard infrastructure (such as roads, rail and ports) and soft infrastructure (such as financial

services, labour and educational changes) are both vital. This is also accompanied by changes in capital, skills requirements from firms and the upgrading of technology, industrial upgrading and increased labour productivity (Lin, 2013; Lin et al., 2011)

Structural economics has changed over time. Old structural economics advocates development policies that advise governments in developing countries to develop advanced capital intensive industries through direct administrative measures and price distortions. New structural economics stresses the central role of the market in resource allocation and advises the state to play a facilitating role to assist firms with the industrial upgrading by addressing externality and co-ordination issues. Both old and new acknowledge the differing active role of governments, their targets and the extent of state intervention in facilitating the movement of the economy from a lower level of development to a higher one (Lin, 2012b). A consistent theme throughout these theories is the exploitation of comparative advantage and factor endowment (Deardorff, 2014; Lin, 2012a; Naudé et al., 2010) in industrialisation.

Industrialisation strategies, both successful and unsuccessful, have been put in place in a number of countries worldwide (Lin et al., 2011). Japan is an interesting success story, being one of the few countries that achieved significant industrialisation without natural resources. Their comparative advantage lay in the cost and efficiency of production (Viotor, 2007).

Lin et al. (2011) identified a six step process for outlining the path to a country's industrialisation's potential success. Once again, Japan is a prime example in reflecting the authenticity of this theory with some of these steps evident in their successful industrialisation process after the country regained independence from America in 1952. These six steps are:

- Drawing up a list of tradable items in similarly endowed countries with 100% per capita income higher than their own;
- Priority should be given to companies who have already entered into the process spontaneously;
- If the concern is a new industry, there should be assistance with promoting it in order to attract foreign direct investment from higher income countries;
- Attention should be paid to private companies identified in step one and they should be assisted in upscaling their respective industries;
- Poor infrastructure and unfriendly business environments should look to develop industrial parks or other trade zones;

- Incentives should be offered to companies identified above (time and financial costs).

Taking the example of the Japanese, their government soldered strong ties with the business community with the industrial policy being implemented collectively (Vietor, 2007). The Ministry of International Trade (MITI) took a significant role in this industrial turnaround and development policy. Industrialisation often requires an extra push from the government (at least for latecomers), often known as industrial policy.

2.5.1 Industrial Policy

According to policymakers, by its very nature, industrial policy is selective as it explicitly and decisively chooses to foster some activities in its attempt to bring about a structural transformation of the economy that is more conducive to industrialisation in order to place the country on a platform of high growth (Moreno-Brid, 2013). This is apparent in a South African context in that the government has identified five specific value chains that it is focusing on to this end (Thomashaussen, 2011).

The implication is that deliberate policy-induced diversification of primary products into manufacturing could help bring about economic development. While, on the other hand, a permanent commodity boom may crowd out manufacturing, which could, in fact, retard it (Frankel, 2010).

Trade liberalisation is often accompanied by conscious industrial policy that seeks to diversify the economic base of the liberalising economy, thus fostering diversification in its exports (Lim & Saborowski, 2012) Industrial upgrading through which economic actors (that is, the nation's firms and even workers) move from low value to relatively higher value activities in global production networks (Morrissey & Filatotchev, 2000).

According to Rodrik (2008), industrial strategy raises two objections. Firstly, he outlines the informational objection, which states that it is impossible for governments to identify, with any degree of precision and certainty, the relevant firms, sectors, or markets that are subject to market imperfections. The second objection is that industrial policy is an invitation to corruption and rent-seeking.

2.6 Beneficiation

Beneficiation results in the specialisation and sophistication of exports (Lin, 2013). This is an outcome of product choices made from a country's comparative advantage and

various factor endowments (Deardorff, 2014; Lin, 2012a; Naudé et al., 2010). The sale of these specialised materials is a product of the degree of competitiveness of the material.

Export specialisation through beneficiation is the process of upgrading materials (Lin, 2013) with the aim to increase materials' added value, therefore increasing the value of a country's exports (Zhang & London, 2013). In order to benefit from this increased value, the material needs to compete with international alternatives on a price and quality level (Deardorff, 2014).

By that rationale, industry competitiveness is a key determinant in the success or failure of a beneficiation model as globalisation and internationalisation have both increased competition. Competitiveness within industries determines the success or failure of an industry's performance in international markets (Zhang & London, 2013)

Productivity places importance on export specialisation and beneficiation, with productivity varying across countries and being one of the key determinants of trade and specialisation (Shikher, 2013). Weldemicael (2014) also placed significance on the composition of trade being directly related to the level of productivity in a country.

In the long term, productivity growth is associated with structural and technological change. This entails a reduction in the costs of producing the same outputs with better knowledge and the relocation of resources from their being lower value added to becoming higher value added goods (Lin et al., 2011). Gan et al. (2013) state that not all beneficiation is good, as, in areas such as mining and refinement, large amounts of resources are consumed resulting in lower resource productivity and economic benefits.

2.7 Competitiveness

The concept of competitiveness has become one of the central preoccupations of industry and government, but is somewhat ambiguous in definition. Porter (2011) stated that, in looking at competitiveness, the analysis should be one that assesses productivity. Vietor (2007) defined the word 'competition', in his context, as when countries contend for market share in the world economy, contesting foreign investment and export sales through their businesses.

Industrialisation is necessary in the developing world in order to increase the country's growth. The intention is to improve a country's international competitiveness in a specific

industry in order to meet product demand in the international market (Zhang & London, 2013)

In order to be competitive, all surrounding factors need to support each other and have the ability to identify any bottlenecks (that is, obstacles to economic growth) that may occur, an ability that Vera (2013) believes to be impossible. Bottlenecks can manifest in a number of ways: accumulation of fixed capital, labour productivity and physical infrastructure, amongst many others (Mold, 2012). Jourdan (2013) identified that these enabling factors are key to competitive beneficiation.

There are two traditional ways of measuring an industry's competitiveness: show-indicators and multi-factor comprehensive evaluation methods (Zhang & London, 2013). Using the multi-factor evaluation method, Michael Porter (2011) developed the Diamond Model in 1990 which identified four core and two peripheral factors that analysed why certain industries were competitive in certain locations (Zhang & London, 2013).

In a research report on the biggest threats to the South African mining industry and its competitiveness, Cawood (2011) identified research and development, education, the nationalisation debate, infrastructure constraints, HIV and labour inefficiencies as the key threats facing the industry at the time of his research. These aspects can all be identified in the Diamond Model

2.7.1 The Diamond Model

Porter (2011) designed the Diamond Model in his book 'The Competitiveness of Nations'. In a diversion from his traditional organisational based research, Porter designed this model with industries being his unit of analysis.

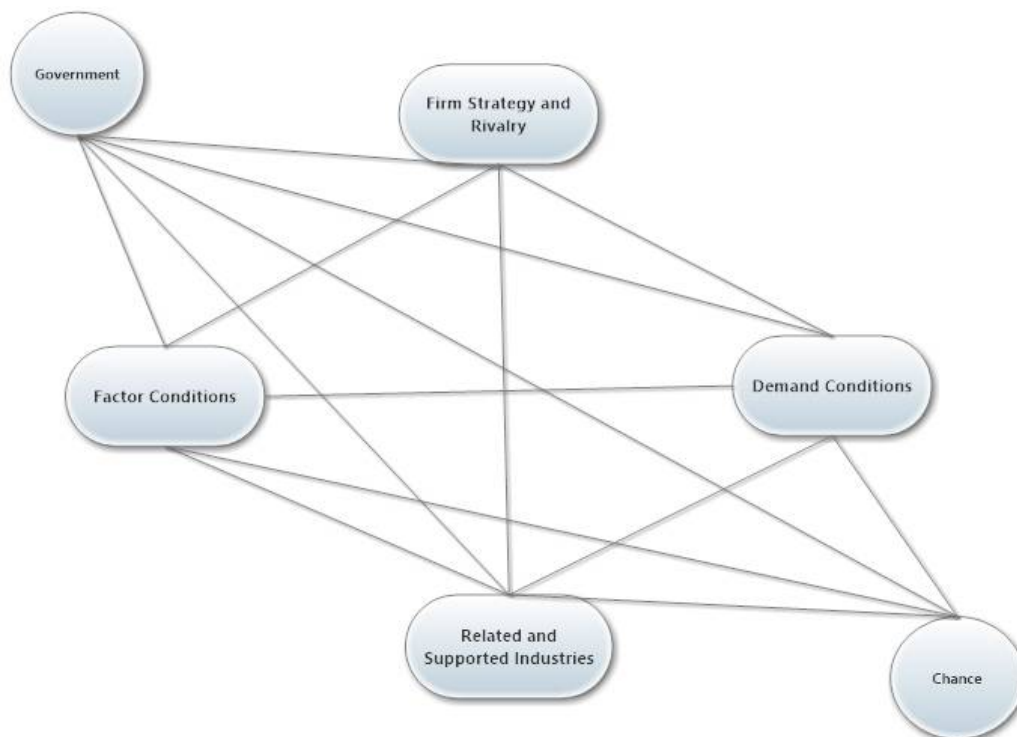
Porter (2011) identified that only a few nations were truly internationally competitive. These industries were not made up by singular firms but of clusters of firms and all participants in the wider industry. A key point raised in the book was also the implications of geographical concentration within each industry and that competitive industries tended to be located in particular areas. The model is graphically represented in Figure 3.

The Diamond Model reflects a mutually reinforcing system. However, Porter (2011) identifies that competitive advantage, based on only one or two determinants, is possible in natural resource dependent industries or industries involving little sophisticated technology or skills. This usually proves unsustainable because it shifts rapidly and global competitors can quickly circumvent it. In resource dependent industries, the factor

costs are usually decisive. Rogers (2003) identifies that this technological gap is a significant issue, as catching up requires appropriate human capital, conducive institutions, incentives and policies, all of which are requirements Porter also raised (2011).

The Diamond Model is not without criticism. One such critic thereof is Grant (2011), who states that Porter's ambitious and theoretical sweep has been achieved at the expense of precision and determinacy. He further states that, at an empirical level, the theory is applied selectively and qualitatively without recourse to rigorous testing of its predictive validity. The issue of predictability has also been raised by Ketels (2011). In an interview with Porter, he raised the issue of the nature of the model and its inability to relate to dynamic environments. Porter acknowledged that the criticism of the Diamond Model's being static is something that is posed often, to which his response is that his work is invariant of time and that every variable ever used has an underlying fundamental.

Figure 3 : Porter's Diamond Model



(Source: Michael Porter – The Competitiveness of Nations).

2.7.1.1 Factor conditions

Factors of production – such as human resources, physical resources, knowledge resources, capital resources and infrastructure – are inputs that are necessary in order to compete in an industry (Porter, 2011). An economy's structure of factor endowments evolves from one level of development to another. Therefore the optimal industrial structure of a given economy will be different at varying levels of development.

Factor endowments lie at the centre of traditional theory of international competitive advantage. In his creation of the Diamond Model, Porter (2011) took these theories further by allowing for more detailed analysis on the characteristics of factors of production. Creating groupings such as 'basic' and 'advanced' factors adds significant depth to the model. The distinguishing features between the two are that advanced factors, which are the most significant for competitive advantage, consist of factors such as technology, infrastructure, sophisticated skills and research facilities. Basic resources consist of resource based elements such as physical, natural and human resources (Grant, 2011). The mix of these factors differs from industry to industry, as well as each having different hierarchies (Porter, 2011).

2.7.1.1.1 Infrastructure

Infrastructure refers to range of facilities, services and installations which enable the functioning of the economy (Porter, 2011). The requirement for infrastructure is not standard across all commodity chains. Morrissey and Filatotchev (2001) identified sets of factors that determine the role that transport infrastructure plays, two of the most relevant to this study are:

- The nature of the commodity has a significant impact on the development of infrastructure in a number of ways. Commodities produced and exported in bulk and in great volumes (such as coal or iron ore) require a large scale transport infrastructure to move their mined outputs. This may have externalities for the local economy, including for suppliers and processors. Leading commodity firms in these sectors are often able to cover the costs of these infrastructural investments. Whereas when governments are responsible for infrastructure provision, fiscal constraints may slow these investments down.

- Secondly, the nature of the country's infrastructure has important implications for the development of linkages. Some infrastructure is highly specific to a particular commodity producer, and exhibits very low potential for positive spillovers that might facilitate the growth of backward and forward linkages.

In terms of infrastructure, electricity serves as one of the most critical functions in the development and prosperity of a nation. The availability of reliable and affordable sources of electricity are a pre-requisite for industrialisation and technological innovation, maintaining a reasonable cost of living and stable inflationary outlook (Moeti, 2013).

By this rationale, therefore, a key area of contention for economic development with regard to beneficiation is the secure and consistent provision of electricity. Electricity problems have perpetually arisen in South Africa. Significant power cuts occurred across the country in 2008, effectively shutting the mining industry down. Far from a surprise, the electricity shortage was predicted and flagged in 1998. However, the South African government delayed the beginning of any expansion until 2004 ('South Africa: power outage', 2008).

Ironically, South Africa has a high energy and electricity intensity which partly reflects South Africa's resource endowments (in particular, the abundance of coal), but is also a function of the historical under-pricing of coal and electricity by the authorities. South African mining and industrial electricity efficiency is particularly concerning and considerably lower than the global average (Kohler, 2014).

2.7.1.1.2 Human Resources

Porter states that human resources relate to the quantity, cost and skills of people. Theorists have raised the concern that the South African mining industry lacks the skills to move from the more basic elements of the mining and minerals' value chain to higher-end value-adding parts. One of the issues that has arisen is that converting individuals with mining skills to those required for activities involving beneficiation is not a simple transition. This highlights the vital importance of focussing on improving education: that is, high-school and technical training systems. This view of skills transfer is also held by Hausmann, Rodrik and Sabel (2008)

2.7.1.1.3 Physical Resources

Porter asserts that physical resources refer to the abundance, quality, accessibility and cost of the nation's water and mineral resources. Additional aspects include proximity to

suppliers and markets which impacts transport costs (Porter, 2011). South Africa's basic factor strength is its resource endowment. This can be referred to as a comparative advantage for South Africa in minerals.

2.7.1.1.4 Capital Resources

A capital resource refers to the cost and availability of finances to each respective industry. This can take the form of debt, equity, bonds, as well as international and local institutions (Porter, 2011). This extends to not just what is available but that which is attainable due to dynamics within the industry.

2.7.1.1.5 Knowledge Resources

Porter (2011) identified these particular resources as scientific, technical and market knowledge offered and located in universities, research institutes (government and private), market research and others. Knowledge skills refer to the industry's receptive scientific, technical and market knowledge.

2.7.1.1.6 Related and supporting industries

One of the significant findings in the Diamond Model is the tendency for successful industries to form 'clusters' within countries. These related and supported industries, referred to as those that can provide inputs important to innovation and internationalisation (Zhang & London, 2013), provide an essential component to competitive dynamism within a nation (Ketels, 2011).

Supporting industries can be referred to as side stream activities such as service based activities, human resources, logistics providers, construction services and plant design (Jourdan, 2013). The role of these institutions is to meet the needs of firms that are not met through the market. Related industries can increase competitiveness through collaboration and economies of scale, and this co-operation between firms and other economic agents can, in turn, aid productivity (Joffe, 1995).

2.7.2 Demand

Porter (2011) utilised domestic rather than international demand in his Diamond Model. His reason for this was that home demand gives industries a clearer or earlier picture of what advantages foreign rivals can have. Through the mix and character of home buyers, the composition of this demand shapes how firms perceive, interpret and respond to buyers.

Traditionally, developing countries export raw material and import manufactured goods. The result of industrialisation changes the trade dynamic to one which becomes more an internal consumption of raw materials and one that has the potential to export manufactured goods (G. Davis & A. Vásquez Cordano, 2013). The challenge in of securing demand in an open market is the competitiveness of the exported materials (whether raw or manufactured) (Zhang & London, 2013).

The choice of international trade as a preference in developing countries is a result of high levels of demand for commodities from fast-growing economies. Countries such as China are dominant importers and have led the global search for suppliers. A consequence of this reliance on Chinese imports results in countries being affected by any changes in demand from China, which then affects large parts of the supplier market worldwide (Coxhead & Jayasuriya, 2010).

The mining industry in South Africa is very concentrated among a few well-established large companies. This results in few players, and, by implication, few commodities being exported due to no or limited local markets. This issue was raised by Joffe (1995) who advocated the introduction of trade incentives to assist in changing this dynamic, along with the introduction of small and medium enterprises into the industry. Ketels (2011) also raises the issue of domestic demand and suggests that conventional wisdom suggests that, as a result of globalisation, international demand should play an increasing active role while home demand should play a smaller, yet still important role.

2.7.3 Firm Strategy, Structure and Rivalry

The term 'firm strategy, structure and rivalry' refers to a firm's organisational structure, management situation and the performance of competitors in a domestic market (Zhang & London, 2013). It is a firm's objective to maximise profit. In order to not exploit the country's comparative advantage, it will seek to attain a comparative advantage when choosing its industry which should have an abundance of the necessary factors required (Lin et al., 2011) Competition within the domestic markets is seen as a driver for innovation and resource development. An industry is large and each firm will only have a subset of the development opportunities that an industry as a whole can exploit (Chatain, 2013).

In the South African mining industry, there are a number of large companies who have historically controlled the market. With the changing dynamic of new entrants into the market, the dynamic of pure oligopoly is changing. Oligopoly pricing is dictated by

elasticity and the number of firms. It is therefore easy to see what happens when trade is opened and there is more competition (Ruffin, 2003).

Research concluded by Joffe (1995) identified three areas of particular concern outlined below. Firstly, he highlighted that oligopolistic collusion in single-firm dominance, rather than intense competition, was the norm in concentrated South African product markets and needs to change. Secondly, he outlined that conglomeration did not promote productivity enhancing co-operation between its subsidiaries; and is not synonymous with entrepreneurial control of South Africa's major corporations; thereby limiting broad-based stakeholder participation in the corporate economy. Finally, market and economy concentration constitutes a particularly hostile environment of dynamic small and medium sized enterprises.

Looking at his first point regarding the presence of oligopolies in industries, it is apparent that this structure is in direct contrast to the reason for the inclusion of firm strategy, structure and rivalry into the Diamond Model and is therefore deleterious. Oligopolies inhibit the rigour of domestic rivalry between firms, which, in turn, creates competitive pressure and increases the competitiveness of the whole industry (Ketels, 2011).

2.7.4 Chance

Various 'chance' and unavoidable issues come into play as well in determining the economy of a country. Market failures are inherent in the process of industrial upgrading and diversification. In such cases, government facilitation is required to help firms overcome coordination and externality issues when the economy moves from one level of development to another (Lin, 2012a). This failure or collapse of local markets occurs when developing countries are severely affected mainly by the low commodity prices and reduced demand for manufactured goods. During market collapse, there will also be a significant fall in private direct financial investment and, by extension, the country will inevitably suffer significant financial losses (Gore, 2010),

A potential mitigation of this risk has been identified as diversifying exports to shield against dependency on primary commodities, which leaves the country vulnerable to commodity shocks, price fluctuations and unfavourable terms of trade (Naudé et al., 2010).

2.7.5 Government

Porter (2011) was of the opinion that government is the most important institution in any economy as its economic policies shape the macro incentive structure of firms in the economy. The positive and negative roles of government in creating competitive advantage are highlighted and viewed as 'influencers' in the Diamond Model. Governments often intervene when implementing and managing industrial policy. These can fundamentally change the competitiveness of the industry and, in turn, affect the supporting environment (Hay, 2012).

Zhang and London (2013) echoed Porter's view of the importance of government. They conducted research, specifically on the Diamond Model, to analyse the role thereof. Their results dictated that government should be included as a core element and not only as an influencer.

There are a number of countries that have required significant government intervention, resulting in their successfully industrialising. In Japan, the state-owned enterprises performed badly, but the private sector thrived due to earnings gained from the state institutions. This was not due to government enterprise failures, but from training and the transfer of ownership (Lin et al., 2011). South Africa currently has state-owned institutions comprising key strategic industries such as electricity, logistics and water. Although the success of this strategy is still under debate in the existing literature, a state-owned public firm is assumed to maximise the welfare of an entire country (Tomaru & Nakamura, 2012).

Chapter 3 – Research Questions

3.1 Introduction

The research questions addressed were reformulated and refined during the research process, most notably during the interview process. Huberman, Miles, and Saldana (2014) identify this as the progression from the conceptual framework developed at the beginning of the study to a more differentiated and integrated research question. A number of the key variables identified in the conceptual outline remained; however, a number of additional ones were added. The reason for this was due to the level and type of information discovered during the process.

The analysis of the competitiveness of the industry provides a structure based on which one can analyse the value chain from extraction to manufacturing and to see whether these activities and inputs add to the material's competitiveness or provide bottlenecks to its success.

3.2 Research Question One

Is the South African mining industry sufficiently competitive to provide an enabling environment for successful mineral beneficiation based on the Diamond Model?

The enabling environment in the mining industry has been raised as having a number bottlenecks to beneficiation. Are the issues within the mining industry's environment prohibitive? For any form of value addition to be successful, the inputs and surrounding environment need to be competitive. Competitiveness in each aspect of the value chain supports the next level and enables it to be competitive itself.

3.3 Research Question Two

What elements are required to be sufficiently competitive to provide an enabling environment for successful mineral beneficiation utilising the Diamond Model?

Utilising the model to analyse what requirements are identified in order to promote a competitive mining environment with regard to beneficiation, provides focus and a structure to assess whether all impediments have and can be resolved. This will provide guidance as to whether focusing on whether exploitation of a comparative advantage through beneficiation is the correct way to successfully promote employment and economic growth.

3.4 Research Question 3

Does the Porter Diamond Model accurately reflect competitiveness in the mining industry in a dynamic environment and is it relevant to future planning?

The research was designed around the Diamond Model. In creating this model, Porter (2011) analyses a number of industries in a number of countries. It is a diversion from his traditional literature and illuminates modelling based on companies within industries, and their concomitant effects on the industries themselves. His analysis is not exhaustive, and the intention of this research was to see whether this model covered all aspects of the South African mining industry. Specific focus was on determining whether the competitiveness of the mining environment could provide an enabling environment to support a particular activity such as beneficiation and value addition.

Porter's (2011) Diamond Model has been criticised for it supposedly having taken a backward-looking approach given that this model was based on historical analysis. The intention is to analyse, through industry research, whether the model would be able to provide a structure that would assist in outlining the means by which to progress in the future in terms of the realignment of strategies based on current and forward-looking analysis.

3.5 Research Question Four

Is it possible to rework Porter's Diamond Model to suit a forward-looking strategy?

Porter's Diamond Model 'point in time', or historical analysis, may be relevant to assess a country's current competitiveness through analysing various countries' industries. The analysis will provide feedback only on what elements are pulling the model out of alignment and what areas to focus on.

This research question aims to establish the core elements of Porter's Diamond Model and to gauge levels of importance and validity as well as establish whether it may be possible to change the model in order to provide a more forward-looking version.

Chapter 4 – Research Methodology

4.1 Introduction

This chapter aims to analyse the choice of methodology in relation to the research conducted. The intention is to define and illustrate why this specific methodology was chosen and why it was best suited to this research.

The objective was to identify whether the South African mining industry was competitive in regard to the South African proposed beneficiation strategy. In order to achieve this, the current status of the mining industry's competitiveness, as well as what the industry identifies as that which is required to increase competitiveness going forward, was investigated. Interviews covered industry leaders representing the elements of the model.

4.2 Research Design

Qualitative research was chosen as the method to be employed in this research. The potential for differing views, common themes and ambiguity indicated a pressing need for promoting the possibility of better understanding, in particular comprehending the latent and potentially obscure issues, which is one of the strengths of qualitative research (Huberman et al., 2014),

The research of this dissertation took the form of an exploratory study. Saunders and Lewis (2012) stated that research of an exploratory nature involves examining new phenomena. In addition, they highlighted the fact that this form of research is utilised in instances where the research problem is uncertain and requires further examination.

The South African growth strategies, at the time of writing, were in implementation stages with beneficiation as a key driving element. Beneficiation, while not new in South Africa, requires a great deal of further exploration. The rapidly changing environment and proposed developments required that the research be cross-sectional in nature (Saunders & Lewis, 2012).

The characteristic of continual change in the South African environment resulted in a number of variables being identified for more detailed research. The research took the form of a deductive approach. The examination of existing theory, and the use of the conceptual framework, the Diamond Model – designed by Porter (2011) in his book 'The Competitiveness of Nations' – underpinned this study.

4.3 Population and Unit of Measurement

The scope of the research addresses the South African mining industry and its up and down-stream value chains, from physical mining up to the point of manufacturing. The focus on competitiveness is restricted to the South African mining industry. However, due to a lack of clarity with regard to the exact definition of 'beneficiation' in South Africa, the scope included all the stages of the mineral value chain. This included the stakeholders in the mining industry as well as representation from the manufacturing industry to provide insight into local demand from a local purchaser of the beneficiated material. The lack of clarity, surrounding the exact definition of where beneficiation begins and ends, was discovered early on during interviews, and this was therefore subsequently added to the scope of the study. As a result, the population therefore includes predominantly mining and manufacturing industries in developing countries.

The comparative advantage in developing countries with significant mineral endowments exposes mining industries to the framework identified in the Porter Model. The analysis of mining industry's competitiveness includes the manufacturing industry, as beneficiation requires a competitive mining industry for its input requirements. Throughout the duration of the research, additional significant issues, which were not initially identified, were raised. However, these were addressed while retaining the initial population established.

4.4 Sample Size and Method

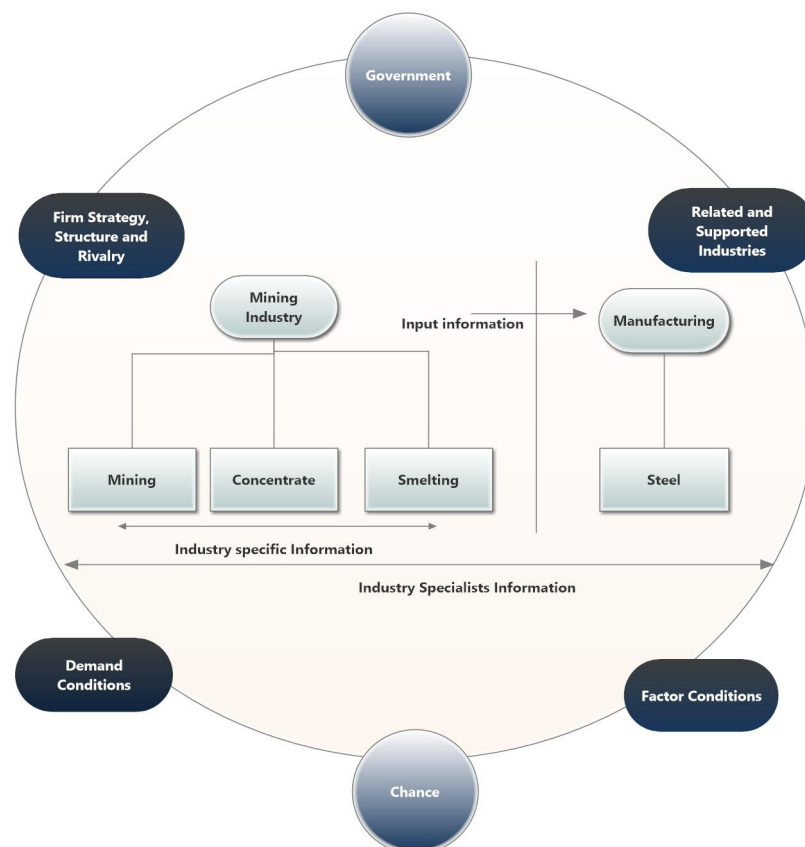
The sampling frame includes the mining value chain in South Africa. The mining industry's competitiveness not only provides a competitive base for beneficiation in the manufacturing sector, but also the beneficiation that takes place within the mining industry at large. Maximum variation, as defined by Harding (2013), is an approach seeking to demonstrate the ranges within the population. In order to ensure that the information gathered was as representative of the industry as possible, maximum variation was necessary when identifying the sample.

Purposive sampling was used in the design of the research. Participants were then chosen based on the researcher's judgement of their suitability to this research. The sample size consisted of 21 industry leaders from the mining and manufacturing industries. The sample size was chosen in order to include appropriate representation

with regard to each aspect of the Porter Diamond Model, and to achieve a fair representation of all views (Saunders & Lewis, 2012).

Participants were selected according to each aspect of the beneficiation process, from the mine through to the final manufacturer. Participants were also chosen to represent different commodities, from low-value/high volume through to high-value/-low volume products. The need for representation of both extremes was due to various commodities' differences in requirements. Participants were also required to represent one or more of the sections of Porter's Diamond Model to maintain theoretical integrity (Huberman et al., 2014).

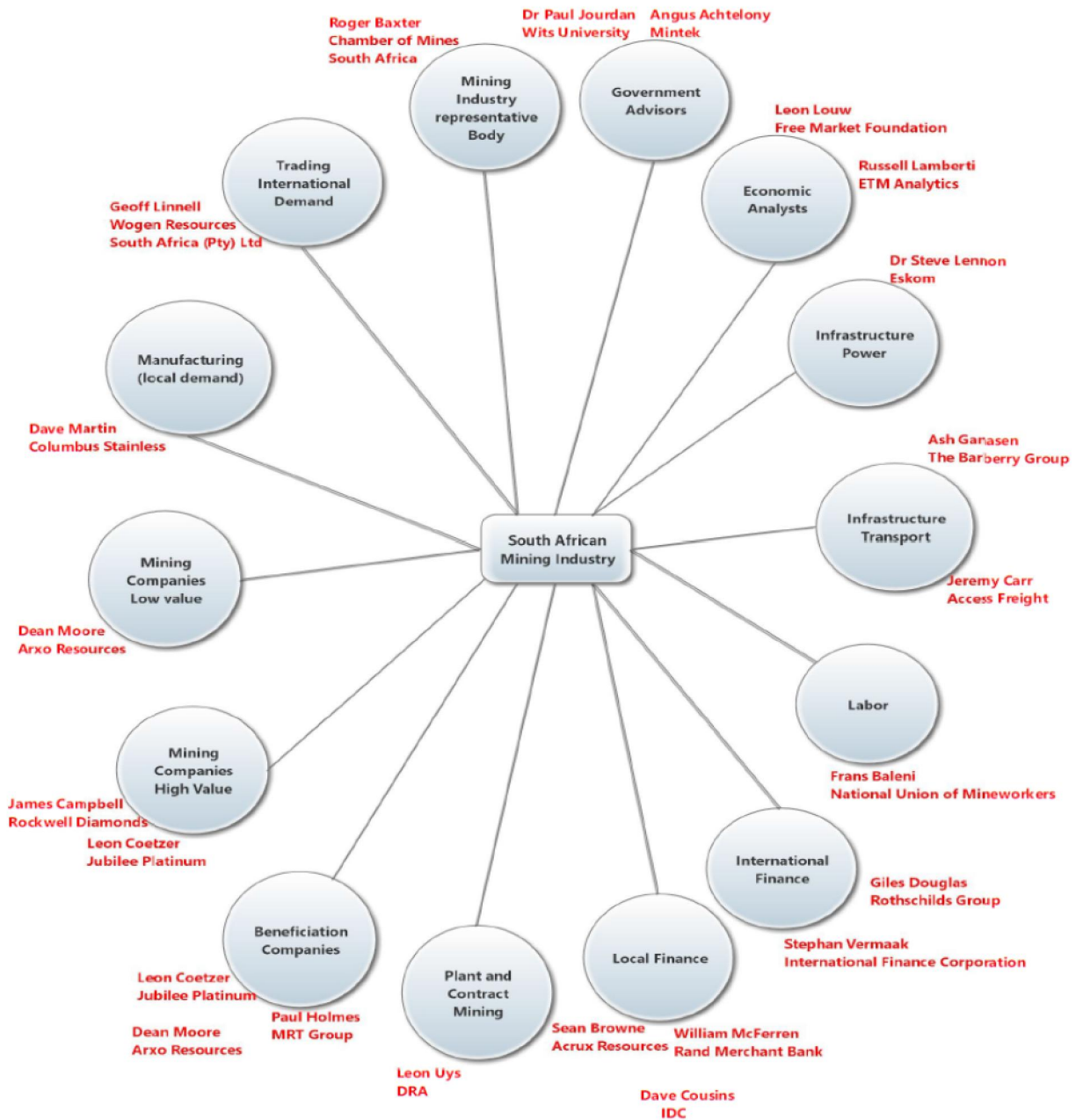
Figure 4 : Beneficiation Process Interview Structure



Participants were further identified from key stakeholders and industry leaders in the mining industry. The majority of these individuals were identified from the elements identified in the factor condition element in the Diamond Model. Participants were chosen due to each one's specific experience in the mining environment or those with industry knowledge. Due to the makeup of the model and the size of the South African mining industry, specialists in one environment were able to discuss the other elements of the model. Figure 4 outlines the various stages of beneficiation, as well as the requirements

with regard to participants, and demonstrates the sections of Porter's Diamond Model that were relevant to all interviews.

Figure 5 : Interview Participants and Industry Representation



Participants who took part in the research can be seen below in **Error! Reference source not found.**

Figure 6 : Participants Interviewed

Name	Title	Company/Organisation
Angus Achtelony	Head: Mineral Economics	Mintek
Ash Ganasen	Chief Financial Officer	The Barbery Group
Dave Cousins	Industry Champion - Mining & Beneficiation	Industrial Development Corporation of SA Ltd. (IDC)
Dave Martin	Chief Executive Officer	Columbus Stainless (Pty) Limited
Dean Moore	General Manager	Arxo Resources Ltd
Dr Paul Jourdan	Adjunct Visiting Professor CSID (SEBS)	Wits University
Dr Steve Lennon	Group Executive Sustainability	Eskom
Frans Baleni	General Secretary	National Union of Miner Workers
Geoff Linnell	Managing Director	Wogen Resources South Africa
Giles Douglas	Managing Director	Rothschild (South Africa) (Pty) Ltd
James Cambell	President and Chief Executive Officer	Rockwell Diamonds Inc.
Jeremy Carr	Managing Director	Access Freight Logistics (Pty) Ltd
Leon Coetzer	Chief Executive Officer	Jubilee Platinum Plc
Leon Louw	Executive Director	Free Market Foundation
Leon Uys	Director	DRA
Paul Holmes	Managing Director	MRT Group Pty Ltd
Roger Baxter	Chief Operating Officer	Chamber of Mines South Africa
Russel Lamberti	Head Strategist	ETM Analytics (Pty) Ltd
Sean Browne	Director	Acrux Resources
Stephan Vermaak	Principle Investment Officer	International Finance Corporation
William McFerren	Transactor - Investment Banking / Resource Finance	Rand Merchant Bank

4.5 Research Method and Data Collection

In-depth, semi-structured interviews were conducted, providing significant depth to the research (Saunders & Lewis, 2012). Expert interviews were identified as being most relevant to the research. South Africa has implemented a number of growth policies, all of which include beneficiation as a key driver, about which the industry raised various concerns. There is concern regarding proposed industrial policy and its implementation without an enabling and competitive mining industry established first. The strongly evocative and pertinent issue of mining industry competitiveness, and unclear guidelines therein, allowed for extremely rich information to be obtained through these semi-structured interviews.

Participants were asked to sign a letter of consent before the interview began. This specified that the meeting may be recorded and that the participants' names may be used to identify that they had participated, but that no information would be ascribed to any participant. Huberman et al. (2014) stated that the research, and intentions thereof, should be an open book to the participants, thereby establishing trust upfront. Interviews were saved under reference numbers rather than by name to ensure anonymity. Recordings were then sent through for transcription.

The interviews were semi-structured in nature in order to obtain in-depth knowledge from industry leaders regarding their experience and knowledge. The interviews incorporated both theory-driven and open-ended questions. At the end of the interview, each participant was asked to complete a short Likert questionnaire, the choices were discussed and questions clarified by the researcher when necessary. The completed questionnaire represented a scale which evaluates and rates responses, based on the theoretical issues discussed in the interview. The interviewer tracked the discussion and ensured that the entire model was covered by marking sections off on a graphic representation of the model as per Appendix A (at the end of this paper).

The interview structure was designed according to a three-step process developed by Galletta (2013).

Step 1 – Opening Segment.

Establish a level of comfort, ensure understanding of the research and obtain the participant's signature on the letter of consent;

Begin with broad questions on beneficiation, encouraging discussion based on the participant's knowledge and experience.

Step 2 – Middle Segment

Begin prompting the participant to discuss issues within the Diamond Model if not specifically raised in step 1. The prompting was done with an element of the model raised as a topic for the following conversation.

Notes were taken to record comments made by participants that required further discussions or clarification. A loop back to this information provided by the participant was then completed.

Step 3 – Concluding Segment

Narrow the discussion for final clarification. The questionnaire was filled in at this time, further information gathered, and the interview was concluded. The questionnaire consisted of two questions devised by utilising Likert Scale style questions as a measurement. The questions were repeated for each section of the Diamond Model.

The questions were a summary of the interview and were completed once the interview had included each element in the discussions. The same questions were repeated for each aspect of the Porter Diamond Model. The full questionnaire can be seen in Appendix B. In the majority of the cases, the questions were completed together with the researcher, and explanations were discussed and recorded in most cases rather than written. The questions pertaining to chance were amended in the discussions to innovation and sustainability.

Throughout each interview, notes were taken when issues that required further investigation were raised as well as to ensure that the notes taken, voice recordings and transcriptions could be triangulated. Test interviews were conducted on two of the participants with the intention of confirming the integrity of the interview with regard to gathering information in the allotted time. Mistakes and issues with interpretation of themes were picked up at this stage (Saunders & Lewis, 2012). Interviews were first taped and then transcribed. Once transcribed, data was inputted into Atlas, categorised and units of analysis coded.

4.6 Data Analysis

The results from the questionnaires were inputted into Excel and simple percentage calculations calculated. Interviews were recorded and transcribed for analysis. Due to the large amount of information gathered, computer-aided qualitative data analysis software (CAQDAS), ATLAS.ti, was used. Friese (2014) identified that the use of CAQDAS was not to purely analyse data, but was a tool which supported the qualitative data analysis which allowed for richer results.

Transcriptions were inputted into ATLAS.ti and codes were created for the primary and secondary segments of the Diamond Model. Throughout the duration of coding the interviews, additional codes were created for trends that emerged. The nature of the topic and the firm views held by all the participants meant that it was important to be as accurate as possible with the results and to gain as much depth into the data as possible. Atlas.ti provided a platform to structure the data into themes and to provide the ability for a more accurate analysis of qualitative data.

Quotations were taken from Atlas.ti for use in the results section with the intention of proving more depth. The references supplied by Atlas were used and do not provide any identifying file extension names. The codes used in this analysis can be seen in 0

4.7 Anonymity

The relevance of beneficitation, as well as the emotive aspect of the topic required anonymity of the participants. Huberman et al. (2014) defines anonymity as a 'lack of identifiers, information that would indicate which individuals provided which data'. The level of participation required this, as information, in many cases, was not published, or, it reflected personal opinion and was therefore not representative of the participant's company. In order to mitigate this, each participant's consent was based on the fact that he/she may be named as having participated in the research but no information given would be attributed to any participant.

As names have been identified indicating the individuals who participated in the research, it is important to ensure that participants were not identified by industry. In a number of cases, only one participant represented an industry segment, so individual representation or any reference to which industry segment the information was attributed to would result in the individuals being identified. No identifiers of segments of the industry would be included in the reference of quotations: only codes representing the transcriptions are illuminated.

4.8 Reliability and Viability

Saunders and Lewis (2012) identify reliability and validity as crucial in research as they have the potential to threaten credibility. Validity has been noted as very difficult to define in qualitative research as it can be very subjective (Harding, 2013).

In order to mitigate as much risk of validity errors as possible, the following precautions were taken:

- ATLAS.ti was used in order to reduce instances of information being excluded;
- Transcripts were read again once the analysis was complete to ensure that the themes analysed, and those which appear in the raw data, were matched;
- Copies of interviews, transcripts, completed questionnaires and AtlasTi were collated and double checked.

Reliability requires that the research conducted must employ data collection methods and procedures of analysis which produce consistent findings (Saunders & Lewis, 2012). The sample frame of this research is very defined and small. As such, there was a limited number of participants who could be sampled. This number reduces significantly when sampling high level industry leaders as was done in this study. The industry, and topic of beneficiation, is one that is evolving and this research has been done at a specific point in time. Industry leaders and participants exhibited contrasting and subjective opinions, relating to a wide scope, encompassing all aspects of the discussion, not just one.

Chapter 5 –Results

5.1 Introduction

The information gained from the interviews formed the primary analysis. The interviews were coded in Atlas.ti with responses based on aspects of the Diamond Model being noted as well as additional themes recorded. The results of the questionnaires were compiled, tabulated and then graph representations of the outcomes presented. Due to the nature and size of the mining industry, the questionnaire results provided an array of different findings. The information gathered during the interviews provided reasoning for these differentiations.

Results from the questionnaires will be included under each element of the Diamond Model followed by results from the interviews. Quotations have been included throughout the results in order to provide more depth to the findings. These have been chosen based on the aforementioned outcomes arrived at, assessing the quotations deemed best representative of for each section.

As alluded to earlier, the topic is highly emotive and thus participants had strong views on the subject. Participants saw the South African Government's strategy as predominantly negative. This perception was not due to the principle of beneficiation per se, but the issue of beneficiation being implemented by industry under duress by the Government. The drive to beneficiate in South Africa is included as part of the country's industrialisation strategy.

5.1.1 Comparative Advantage

The motivation for the inclusion of beneficiation in the South African industrialisation strategy is primarily due to South Africa's mineral endowments. There has been consensus that these endowments represent a comparative advantage for South Africa.

The core issue raised throughout the interviews, in reference to beneficiation, was the ability and necessity to turn this comparative advantage into a competitive advantage. It was suggested that this conversion to competitiveness is a fundamental requirement to success. Respondents agreed that, in order to compete on a global scale, the mining industry needed to be competitive and required an enabling environment in order to do so. Further to this was whether South Africa should focus so strongly on the mining industry alone. There have been a number of examples globally where the natural resources were not required in the home country in order to compete.

'So comparative is one thing, competitive is another thing. You need to be competitive at what you do. To suggest that, okay, we don't have to be competitive at mining and therefore what we do is make ourselves beneficiate and now we're going to be competitive. That's rubbish' (Interview - P1: 07.21.1.14.rtf).

During the interviews, the researcher raised the issue of the resource curse as a result of South Africa's comparative advantage. With regard to this, the majority believed that South Africa did not suffer from the resource curse.

'..If you look at the country as a whole and how it developed, we've made good use of the money we earn from our resources. The resource curse is when you fall apart completely and we haven't done that. So there's a very good example of using it well – platinum industry, gold industry, coal industry. There's no other necessary source because they are keeping the country alive, but it's not the only source of earnings for the country. So I wouldn't, I don't think I'd buy the argument of the resource curse in SA' (Interview – P 8: 07.28.3.14).

A number of participants outlined that the South African situation did not just materialise as solely a result of funds as raised above, but was also made manifest through the resulting government policies. These were identified as being not just an issue pertaining to natural resources, but relevant to beneficiation itself.

'All this beneficiation is the resource curse. It's the belief that because we have resources we should adopt stupid policies and that's the curse. The curse is the impact it has on policy formulation' (Interview: P19: 10.07.1.14.rtf).

5.1.2 Industrialisation

Various policies and strategies have come into being, and formed part of the South African Government's growth and industrialisation strategy. The country's need to industrialise has created the push for beneficiation in the minerals industry. The respondents raised concerns about the clarity of the mining industry's role in these policies. There was further concern about what value chains have been included in these strategies. It was raised that there is no clear identification of where mineral beneficiation ends and where manufacturing starts, further confusing the strategy. The Chamber of Mines provided the ensuing graphic representation in Figure 7, which illuminates where

the mining section ends (stages three and four) and where manufacturing begins (stages one and two).

Figure 7 : The Four Stages of Beneficiation

STAGE	MINERAL BENEFICIATION PROCESS CATEGORY	PROCESS FLOW-CHART	LABOR INTENSITY	CAPITAL INTENSITY	INDUSTRY CLUSTER
1	The action of mining and producing an ore or concentrate (primary product)	Run of mine ores → Washed and sized concentrates	HIGH	HIGH	MINING
2	The action of converting a concentrate into a bulk tonnage intermediate product (such as a metal or alloy)	Mattes/slags/ Bulk chemicals → Ferro alloys/ pure metals	LOW	HIGH	MINING
3	The action of converting the intermediate goods into a refined product suitable for purchase by both small & sophisticated industries (semis)	Steel/alloys → Worked shapes and forms	LOW	HIGH	REFINING / MANUFACTURING
4	The action of manufacturing a final product for sale	Worked shapes and forms → Worked shapes and forms	MEDIUM TO HIGH	MEDIUM TO HIGH	MANUFACTURING

Source: Adapted from 'The Chamber of Mines South Africa'.

Many of the respondents were unclear on the value chain, and, in certain instances, outlined government policies and incentives that, they believed, did not recognise certain beneficiation processes, despite their falling within activities in the mining industry that would be considered beneficiation. Significant concerns were raised regarding limited dialogue with industry.

'Long before we start talking about industrialisation, we should start talking about how to boost and stimulate and re-establish and reinvigorate and redefine our mining sector. We should be saying, "How do we get back to being top dog in mining? What did we do wrong? Why did we lose it? Where did we lose the plot? And how do we get back to being winners instead of losers?"' P12: LL - 2014.07.25_10.07_01.rtf).

5.1.3 Beneficiation

The prospect of beneficiation without competitiveness was a fundamental issue raised in the interviews. There were mixed feelings from the respondents with regard to the necessity, viability, timing and nature of beneficiation. As the participants represented a wide range of sectors within the mining industry, the responses varied. In some cases, the respondents acknowledged a need for beneficiation on the basis of an enabling

environment rather than a forced requirement by government. Some respondents were enthusiastic about the process. They could, however, not proceed as they were constrained by the current environment. Well over half the respondents were strongly against beneficiation if the result was not competitive and the economics did not work.

A common theme that was salient throughout all the interviews was the ambiguity of the government's beneficiation intentions. They also discussed the fact that the chosen value chains representing commodities that require significantly different inputs and are sensitive to different industry variables, were grouped under the same umbrella by the government. The concern here was that the government's beneficiation intentions were targeting too many minerals that have very different enabling requirements and value chains without adequately assessing these differences. A large number of the respondents suggested that the government focus on only one value chain and its enabling environment, making it very competitive, and, only then, move to other value chains.

'Again that's why if you want the beneficiation strategy in South Africa, don't be so broad, but pick one that the government is convinced is the most important, whatever that might be. Implement everything that supports that industry to grow and do it. You can't do it without energy, people, technology and you can't do it without investment. All those factors must work' (Interview: P 7: 07.28.2.14.rtf).

In order to establish the current competitiveness of the mining industry and what is required for it to be competitive going forward, the different sections of the Diamond Model are broken down below.

5.2 Diamond Analysis

During the interviews, respondents spoke freely, and, assured by confidentiality, were extremely forthcoming with their feedback. In order to ensure the relevant model was discussed in all interviews, the researcher, at times, prompted discussions in the areas required in order to enable balanced feedback on each section. The discussions were open to additional input and themes outside the model in order to gain as much information and depth as possible.

At the end of the interview, respondents were requested to rate the areas of the Diamond Model, pertaining to beneficiation, according to those that were relevant to current competitiveness in the mining industry. They were also asked the same questions with regard to the level of importance of each area of the model going forward. At times,

respondents openly disagreed with aspects of the model and any disagreements were explored and included in the research. The results from the questionnaire and interviews differed sometimes and these issues are raised in the results.

Results in the model's analysis are presented in two stages. The results of the questionnaires are presented first, followed by in-depth analyses of the interviews.

5.2.1 Factor Conditions

Throughout the interviews, factor conditions – specifically labour, skills and power – were raised more than any other aspects.

5.2.1.1 Participants' Ratings

Figure 8 : Current Competitiveness - Factor Conditions

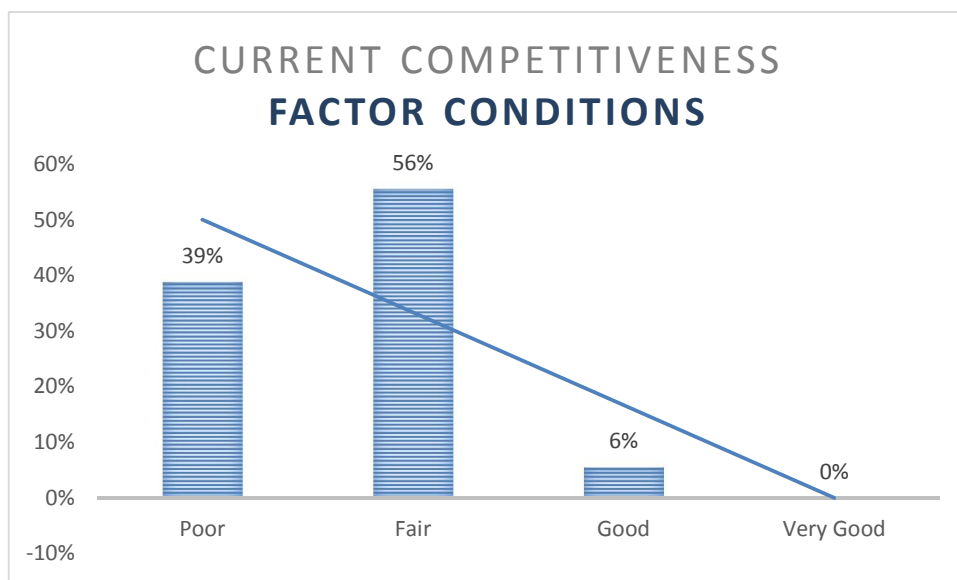
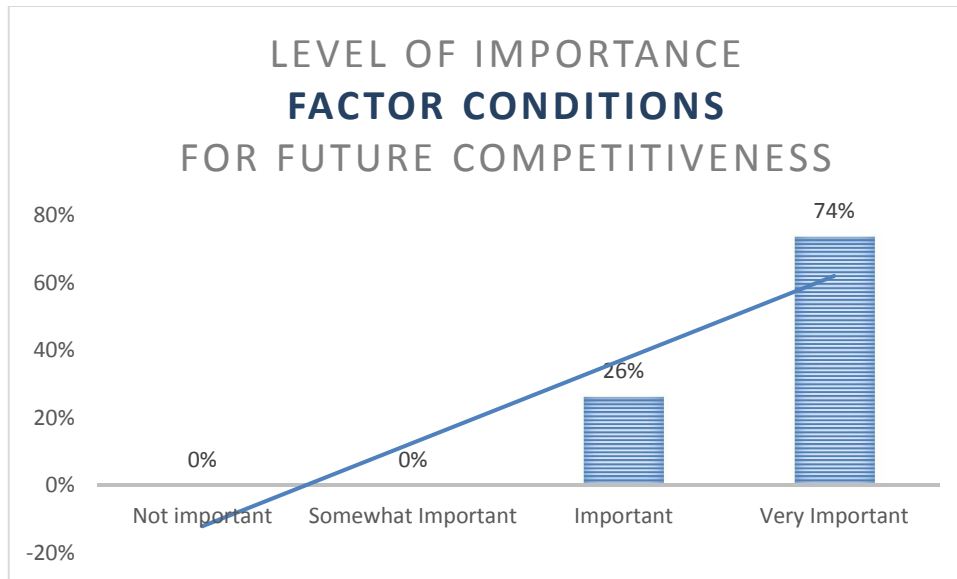


Figure 9 : Level of Importance - Factor Conditions



With regard to beneficiation, the current competitiveness in the mining industry, based on the findings, on factor conditions, derived from the questionnaire, can be seen in Figure 8. These can be broken up as follows: the participants predominantly answered that factor conditions in South Africa were either 'fair' (56%), 'poor' (39%) or 'good' (6%) with no respondents answering 'very good'.

With reference to beneficiation going forward, regarding the importance of factor conditions required for competitiveness in the mining industry, the results seen in

Figure 9 showed that the levels of importance only contained responses of this being 'important' (26%) or 'very important' (74%).

The results clearly demonstrate that the importance of competitiveness in the future is not deemed present in the current competitiveness condition. Both results are presented strongly at opposite extremes, highlighting a serious issue with regard to the current situation of the various factor conditions. This also demonstrates the extremes of the issues with regard to forced beneficiation without the required enabling factor conditions.

Factor conditions consist of a number of different areas. As seen earlier in this chapter, participants agreed that South Africa does have a comparative advantage with regard to its mineral endowments. In order for the results to show the poor results as dominant

and strongly expressed despite this comparative advantage, means that the concern in the other areas must be significantly pronounced to override this advantage.

5.2.1.2 Interview Results

It was evident throughout the interviews that factor conditions were the predominant concern and, thus, there was significant focus and time spent on addressing and discussing competitiveness in the mining industry.

Factor conditions contain a number of aspects such as infrastructure, human resources, physical resources, capital resources and knowledge resources. Based on the emphasis placed on factor conditions, combining these into a single analysis did not provide an accurate interpretation of this result. To establish more depth, each individual was included to establish all their contributions to the result.

5.2.1.2.1 Infrastructure

Infrastructure was raised as one of the key issues with regard to competitiveness in the mining industry. In particular, the condition of current infrastructure, the maintenance of current infrastructure and the time delay in commissioning new infrastructure were the three main topics investigated. The inconsistency of investment was seen as a predominant reason for the state of infrastructure and the significant lag in infrastructure development compared to industry requirements. A number of respondents stated that investment in infrastructure needs to be ongoing throughout all economic cycles in order to keep up with development. This lack of investment was an issue that was raised as one of the reasons for the current bottlenecks. The two responses below highlight the importance thereof succinctly.

'We just use something until its finished and only then do we try and fix it. It's too late. So instead of maintaining and improving, we just sort of decay, slowly decay' (Interview: P 6: 07.25.1.14.rtf).

'There's an issue about the timing of the investment in infrastructure. Because these things take a long, long time, what we don't get right in South Africa is to have a constant stream of infrastructure investments that will keep us developed' (Interview: P20: 7.21.3.14.rtf).

5.2.1.2.2 Power

The availability and consistency of power was one of the three top issues raised as an obstruction to growth, competitiveness and beneficiation. Beneficiation relies on power, and, more importantly, the reliable and consistent supply of power. The majority of the respondents raised the concern of whether sufficient power would be available even after the potential capacity increases.

'...You have a serious constraint in power. I mean we're already getting brown outs and black outs and load-shedding. So, if you put in a high intensity industrial complex that uses, you know, anything more than a couple of mega-watts, this system won't handle it' (Interview: P4: 07.24.1.14.rtf).

As mentioned by a number of the participants, they consider the lack of growth to be attributed to insufficient electricity. On the other hand, other participants saw an excess of power, when new power stations materialise, as having the potential to cause problems due to our incapacity to deal with this volume.

'My fear is that we might end up with excess capacity because I do not see an economy growing at a pace which would match what we have. But it's a different problem to have more capacity than less capacity, then we have the other aspect, especially on beneficiation' (Interview: P13: 08.01.1.14.rtf).

5.2.1.2.3 Road, Rail and Ports

Road, rail and ports were raised as contributing factors to the industry's competitiveness. With regard to this factor, it was noted that, from the point of view of mining companies who produce high value materials, transport was not of primary concern. Respondents involved in the movement of bulk material, however, placed significant emphasis on costs and capacity due to tighter margins. The transport costs are a key cost item in the competitiveness of bulk material miners and traders.

'I think we underestimate the transport issues and I think the thing that we're not paying enough attention to saying is how you can get your transport infrastructure costs to be globally competitive. I really worry about the cost of transport in South Africa being non-competitive' (Interview: P20: 7.21.3.14.rtf).

With respect to transportation, businesses involved with bulk materials identified Transnet as a company responsible for significant constraint. A number of respondents

stated that, as a result, large quantities of the bulk material going to the ports for export are forced to be transported by road. This is often uneconomical and damaging to the road network.

'So does Transnet have the ability to move it? I think the answer is no. I think there are lots of competing projects in the market. We are sitting on a very old rail infrastructure here. With regards to wagons and locomotives, there are big plans to increase and upgrade, but that is a long-term plan. We are talking 2030' (Interview: P5: 07.24.2.14.rtf).

5.2.1.3 Human Resources

Human resources included labour and skills, both of which were seen as a concern for South Africa's growth and as a serious limitation to the mining industry's competitiveness.

5.2.1.3.1 Labour

Labour was raised as another of the top three issues hampering competitiveness. Specific reference was made to unions, unrest and productivity. At the time of this research, severe strikes and labour issues had impacted the mining

'If they can't get the right skilled labour, if they've got striking labour, if the labour is too expensive on a comparative basis; how are you going to compete? I guess, finally, I think comparatively our labour is out-pricing itself' (Interview: P 1: 07.21.1.14.rtf).

'I don't know where we go with that, but the fact is you've got a workforce that has, maybe for historical reasons, got a lot of gripes and issues and complaints; but, on a global level, is paid relatively well, particularly relative to the productivity they produce. So it's very difficult to announce that we must pay the unions or the labourers more, accept lower productivity from them, because it seems to be going in decline, and somehow compete on a global platform with higher power costs, etc. within the beneficiation strategy' (Interview P 1: 07.21.1.14.rtf).

A common theme running through the feedback, and the subsequent effect on competitiveness with regard to labour and productivity, was that of a poor education system.

'With education, you know a shocking education system, how can you be more productive? How can you get more productive if you don't have the means? One of those means is education' (Interview: P 16: 08.05.2.14.rtf).

Another concern pertaining to labour, as highlighted by the majority of the respondents, was that labour was too expensive in relation to output. Three participants raised Australia as an example of a country with a high cost of labour, but high productivity as well. This is contrasted with South Africa's labour, which the participants identified as increasing in costs but less productive.

'I don't think South African labour per se is very expensive from a Rand value perspective. It's what you get back from that labour, that's the problem, and I think that that is a huge issue' (Interview: P 9: 07.30.1.14.rtf).

5.2.1.3.2 Skills

As mentioned earlier, a salient theme throughout the discussion around skills was the lack and quality of education in South Africa.

'... If you look at the way the mines operate, there's enough labour to go around, but skilled labour, yeah, I don't think there's enough' (Interview: P 8: 07.28.3.14.rtf).

'We have also got to educate our people. We've lost a generation already. Post 1994, we've got to get our education right' (Interview: P 1: 07.21.1.14.rtf).

'... When you've got such a chronically unemployed population, their experience of ever having done anything, and to learn by doing, is just so minimal that you're almost trying to start from scratch with a lot of these industries. So we're not only deficient in book knowledge, but we're deficient in the "learning by doing" knowledge, because we haven't created enough opportunity' (Interview: P 9: 07.30.1.14.rtf).

5.2.1.4 Physical Resources

As outlined at the beginning of this chapter, respondents agreed that South Africa has a comparative advantage in mineral resources. There were differing opinions on the effect of country location on the competitiveness of the mining industry. As with transport, the speed at which the goods reach the market and costs for the high value minerals were

not as critical, only really when dealing with bulk materials. Long distances to markets make it hard to compete with countries that are closer and have less costs incurred.

'Now one of the most important factors in terms of competitiveness is how quickly you can get it to the market and whether you are competitive with the guys that are sitting – let's say the Australians– right next to Japan. And Indonesians who are right next to China and the North Africans and the South Americans who are very much closer to their target markets' (Interview: P 4: 07.24.1.14.rtf).

5.2.1.5 Capital Resources

The discussion around capital (its cost, origin and type) identified a number of contrasting opinions and experiences. It was clear that the feedback was dependent on the individual circumstance and requirements. With regard to capital raising, there was a difference between the type and value of the resource, the level of difficulty of mining, the stage of development of the project and the origin of the funds (local or international).

'So, anything pre-feasibility, we are seriously unsophisticated in this market. Post-feasibility study, we are extremely sophisticated. So, pre-feasibility, we are relying on foreign capital, which we are then competing on a global basis for' (Interview: P 2: 07.21.2.14.rtf).

'Capital into platinum has just about dried up because of the negative perceptions created around labour issues – not that it's not the same everywhere, but that's the perception. There was such a nice quote that this one capital investor told me, because I spent the meeting trying to educate him on why his perception was wrong, he told me a very important point. He said that, with regard to capital investors out of Europe investing into Africa, their return is quite often dependent upon their perception of the market that they are investing in because it's listed entities whose prices are driven by market perception' (Interview: P 7: 07.28.2.14.rtf).

During the interview, the stage of growth of the mining sector played a significant role in its acquiring funding and the ability to beneficiate. In respect to beneficiation, the acquisition of funding for capital intensive smelters and refineries is a great deal harder for smaller companies that it is for larger ones.

'So if you look at the different commodities, you've got majors, you've got platinum industries, you've got majors with your iron industry and then you've got quite a few

juniors in your chrome and manganese coal. It's predominant because the chrome manganese and coal mines are a lot less capital intensive than your deep level gold, but that creates issues around beneficiation – they don't have capital to build these big smelters and refineries' (Interview: P 8: 07.28.2.13.rtf).

There was mixed feedback as to the availability of local funding and the reasons for approaching foreign markets for financial support. In some cases, the feedback was very negative and in others completely the opposite.

'It's shocking capital in this country, almost impossible. That is why all the companies that are listed are offshore in either Canada, the UK or Australia' (Interview: P 17: 08.06.1.14.rtf).

Capital acquisitions offshore were noted as a key source of funding for South African mining companies. There was also a concern that, as a result, money made from South African resources is taken offshore to international shareholders and not being used or distributed locally.

5.2.1.6 Knowledge Resources

As alluded to earlier, there were some contrasting views on the presence and availability of these resources. The issue of poor basic education was raised again as an inhibitor to the education of strong knowledge resources, and, concomitantly, the entry of significant high level skills into the industry.

A number of the participants noted that there are, however, significant existing technical resources in South Africa.

'Knowledge resources in the mining sector, I think we have got some of the best in the world, in terms of technical resource' (Interview: P 2: 07.21.2.14.rtf).

There were also a few respondents who stated that a number of human resources with knowledge have now left the country due to Black Economic Empowerment hiring policies.

A concern was raised regarding insufficient research and development facilities provided by government. Based on the downturn stage in the business cycle, research and development within local private institutions has been insufficient, mainly due to capital constraints.

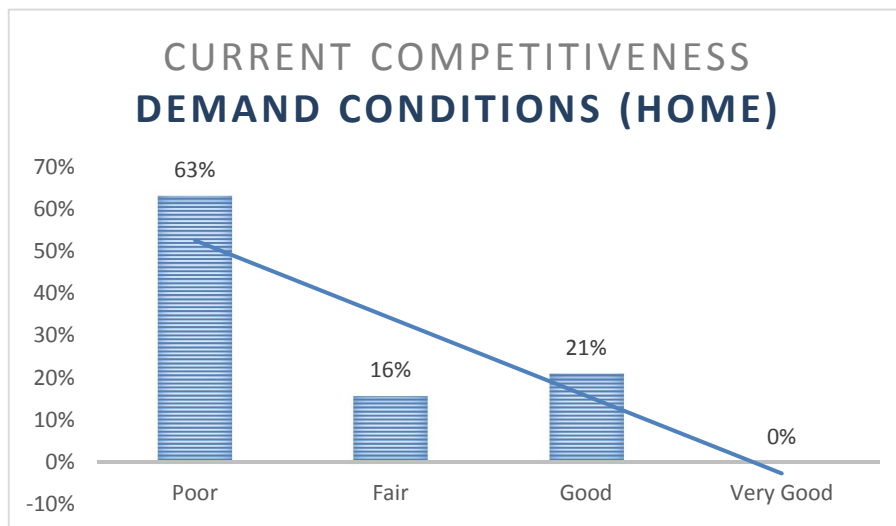
5.2.1.7 Summary of Factor Conditions

Despite significant comparative advantage, resource endowment and sufficient knowledge resources, concerns and issues with infrastructure (power, road and rail) and human resources (labour, skills and education) resulted in the participants' perception thereof weighting towards 'fair' and 'poor'. All participants stated that factor conditions were 'important' and 'very important' going forward. Based on the results from the interviews and questionnaire, human resources and infrastructure needed to be addressed as a matter of priority.

5.2.2 Demand Conditions

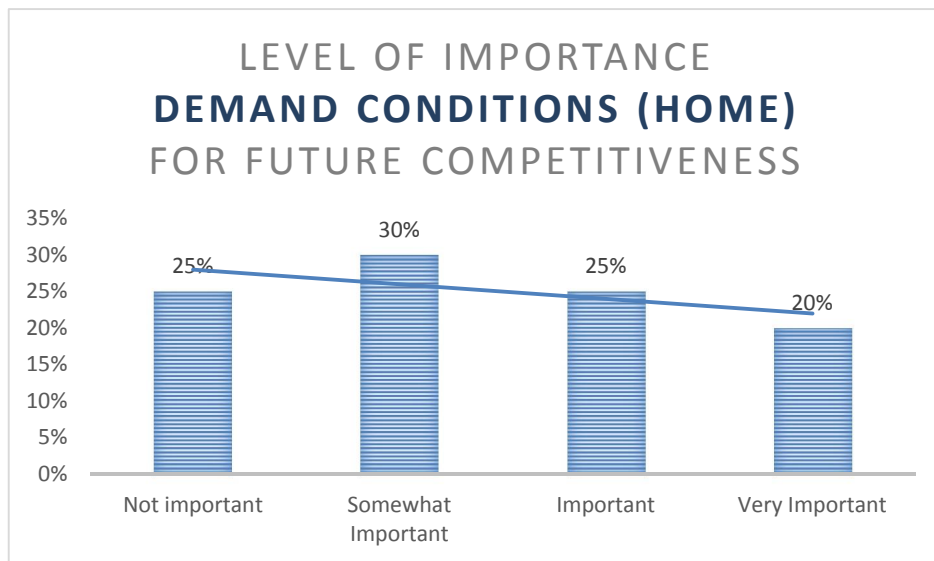
5.2.2.1 Participants' Ratings

Figure 10 : Current Competitiveness - Demand Conditions



With regard to beneficiation, based on the questionnaire of home demand; the current competitiveness in the mining industry as can be seen in Figure 10 can be broken up as follows: the participants predominantly answered that factor conditions in South Africa were mainly 'fair' (16%), 'poor' (63%) or 'good' (21%) with no respondents answering 'very good'.

Figure 11 ; Level of Importance - Demand Conditions



Aligning these results with the interviews culminated in the discovery that the answers were, in many cases, answered with regard to the relevance of the question to the actual environment. The result of 'poor' (63%) in Figure 11, compared to feedback given in the other interviews, was partly due to the fact that local demand was not of primary concern, as well as the fact that focus was being placed on international demand.

The level of importance in home demand conditions for future competitiveness in the mining industry revealed mixed responses, ranging from 20% to 30%. This results in a range of 10% between the four options. As with the reason for 'poor' current competitiveness, respondents were split between those that rely predominantly on home demand, such as service providers, and those who rely on home demand as their main market. The 'important' and 'fairly important' responses were a result of respondents who had access to international markets and could obtain better pricing, as well as those whose production could not be met locally.

It was noted that within the sample, there were individuals from supporting industries who participated and who would have a larger focus on local demand based on their reliance on business with local mines. Thus, in the analysis of demand in the mining industry, responses were taken into account, but not the focal point in the interview analysis.

5.2.2.2 Interview Results

5.2.2.2.1 International Demand

During the interviews, it was clear that globalisation is a fundamental aspect in analysing the mining industry and both local and international demand.

'No industrialist starts making something by saying what the demand within his borders is. They start making something by saying what the demand is. Full stop' (Interview: P 19: 10.07.1.14.rtf).

'South African market relatively, in a global context, is very small. In any of these we are playing on the global stage' (Interview: P 2: 07.21.2.14.rtf).

'.....You do have a large local market – it may have tweaks from mineral to mineral, but I would say by and large, it's a global industry' P 1: 07.21.1.14.rtf).

'So to say that you need an element of local demand sort of puts the cart before the horse in a way. Again where is demand derived from? It's derived from productivity' (Interview: P 9: 07.30.1.14.rtf).

The core theme running through this section of the interview is that the choices made pertaining to local and international sales is based predominantly on the economics of the sales and where the best price can be achieved.

'.....With the globalised world, you would have to say, actually, locally, demand is completely irrelevant. It is a global market' (Interview: P19: 10.07.1.14.rtf).

'They have to be economically viable and the whole stuff isn't economically viable, and, so, going back to logistics, which I say determines that, the problem is that our market is small that you cannot create economies of the international scale based on our domestic market' (Interview: P 11: 31.1.14.rtf).

5.2.2.2.2 Domestic Demand

During the interviews, there was a differentiation concerning where the various participants saw the stages of beneficiation and at what point demand could switch from local to international in the value chain process.

'If you define your beneficiation chain as a low value add beneficiation all the way to high value add beneficiation, I think a domestic market is required on the low end side' (Interview: P 16: 08.05.2.14.rtf).

A common issue that was raised by most of the participants was that of import parity pricing and its existence in the local market. This equalisation with the international market would create the ability for companies to sell commodities produced in South Africa at international prices without having to incur the transport and related costs. This was seen as by some as uncompetitive and viewed by others as sound business practice. Below, the participant reveals his opinion of the former:

'So it's not a cost based pricing, it's a competitive based pricing and that's what's called imported parity, because they're putting it basically at the same level as what you would have to import it at' (Interview : P 4: 07.24.1.14.rtf).

Other participants saw it as fair business practice.

'We're in a competitive global world where the prices are determined on a global scale basis, but if you are making a product that will be sold and people want it even if you make it in South Africa; it's part of your demand and there are certain advantages to sell to a home base. Your transport is cheaper, your logistics less costly, and all of that; but you're still going to sell it at the same price as what you're going to sell it internationally, because, if there is a demand, you're going to sell it to the highest price payer and you don't want to subsidise to pay to anybody else (Interview: P10: 07.302.14.rtf).

5.2.2.3 Summary of Demand Conditions

As outlined by some of the respondents, with South Africa's high level of endowment, it is unlikely that the local market will ever be able to consume the material produced based on South Africa's size. It was further raised that, based on some of the lower value materials (such as chrome, manganese and iron ore), the margins are very tight. As a result of this, material needs to be moved and sold in bulk to be competitive, and, as such, the country has to rely on economies of scale. Local demand would not be able to satisfy the volumes.

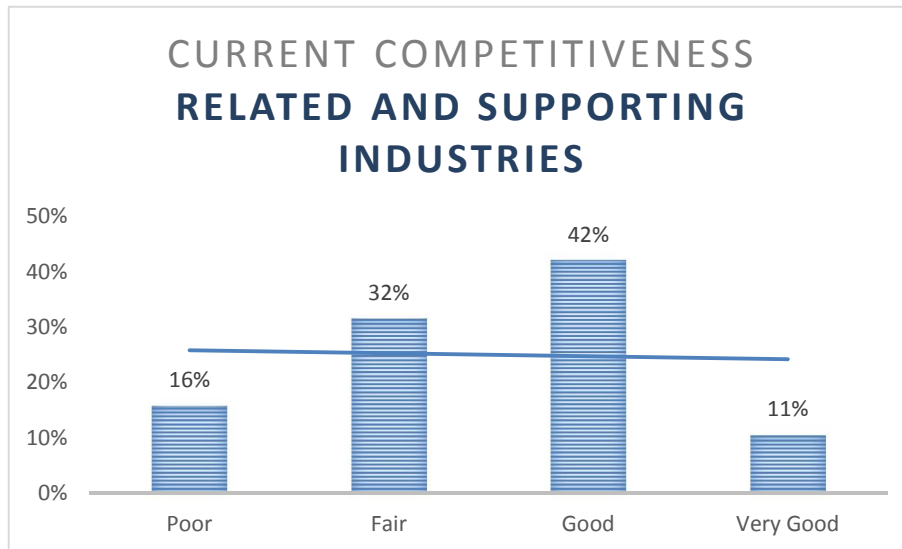
Although there were responses that were positive about home demand, the interviews showed very strongly that focus on home demand was not relevant in a global economy

based on the nature, volume and value of commodities being mined and beneficiated in South Africa.

5.2.3 Related and Supporting Industries

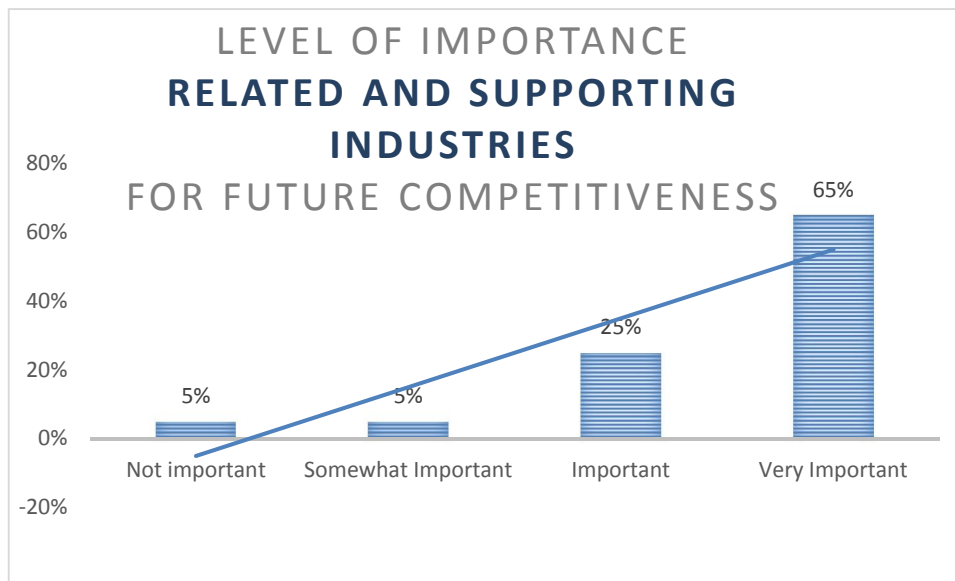
5.2.3.1 Participants' Ratings

Figure 12 : Current Competitiveness- Related and Supporting Industries



The current competitiveness in the mining industry, with regard to beneficiation based on the questionnaire of the related and supporting industries, as can be seen in Figure 12 , revealed the following: the participants predominantly answered that factor conditions in South Africa were 'very good' (11%), 'good' (42%), 'fair' (32%) and 'poor' (16%).

Figure 13 : Level of Importance - Related and Supporting Industries



In the context of beneficiation, regarding the importance of related and supporting industries required for competitiveness in the mining industry, the results seen in Figure 13 were predominantly 'very important' (65%), 'important' (25%), 'somewhat important' (5%) and 'not important' (5%).

Based on the interviews, the ratings of 'good' were generally with regard to supporting industries and were differentiated by certain commodities.

5.2.3.2 Interview Results

5.2.3.2.1 Service Providers

Service providers play a critical role in the competitiveness of the mining industry. These can be seen as contracting miners, logistics companies, fuel and power supply. As detailed above, in South Africa, the provision of energy is predominantly a monopoly run by the state-owned institution, Eskom. Fuel is predominantly run by large corporations and government regulated. As a result of this, there is very little competition amongst these supporting industries. The main supporting industries discussed during the interviews were those of logistics companies and companies within the financial sector.

5.2.3.2.2 Logistics Companies

There is significant competition between logistics companies, resulting in lower costs. The industry is also entrepreneurial and dynamic. This results in better prices available to mining companies as well as facilitating access to modes of state-owned monopoly

transport such as rail. A number of players exist in this market, resulting in increased competitiveness.

A number of the respondents noted that there was positive collaboration, creating further competitiveness. This collaboration predominantly emanated from the private sector

'What you are finding is that there is a certain amount of collaboration that exists there in order to improve a channel. This is to get a critical mass down a channel, and therefore drive costs down. And I think from a producer – trader level – a lot of those guys are very happy to do that, because, you know, it is South Africa incorporated, and driving down, turnaround times and the like make it competitive. You should get the lowest cost option, even although your competitor is also going to get it, but this makes us more competitive in the overall market' (Interview: P5: 07.24.2.14.rtf).

5.2.3.3 Financial Environment

South Africa is recognised as having one of the best financial industries globally. The standard of the financial industry adds to the competitiveness of the mining industry and contributes a great deal to financial sustainability. Different aspects were raised in a number of interviews. The following comprehensive analysis was outlined by one participant in particular, who expounded on the significance thereof.

'I mean do people understand that we are ranked number one in the world for the quality of our auditing standards? We are ranked number one in the world for the efficacy of our corporate boards. We're ranked number one in the world for the protection of minority shareholder interests. We are ranked number one in the world for the regulation of our stock market. We are ranked number ten in the world for investor protection' (Interview: P5: 07.24.2.14.rtf).

Despite the financial industry being ranked highly in regard to the above, in the interviews, participants stated that, in completing the questions, the difficulty in raising funds influenced participants from affording the industry higher rankings.

5.2.3.4 Summary of Related and Supporting Industries

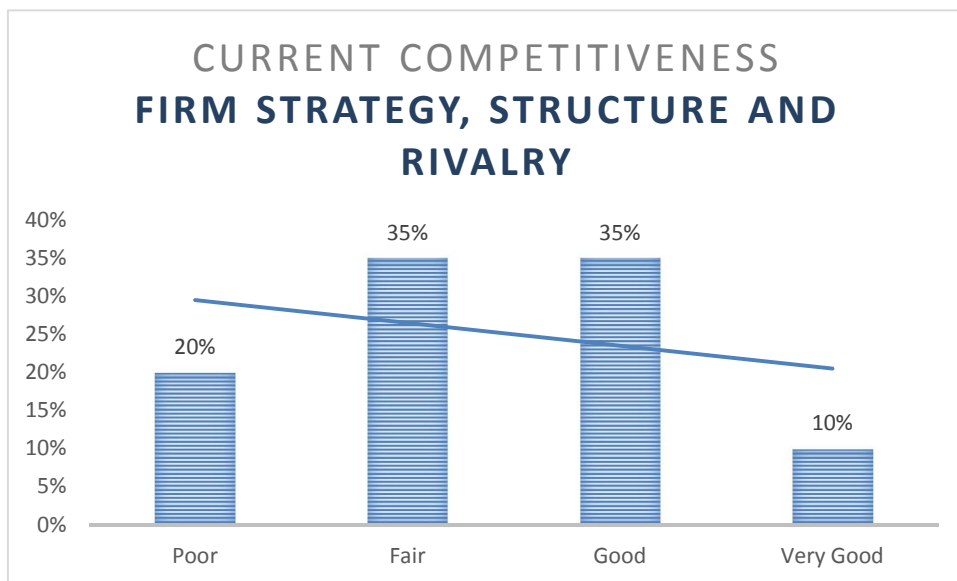
Related and supporting industries are identified as critical for competitiveness to transpire in the mining industry. The questionnaire identified that the related and supporting industries were predominantly 'good' and 'fair' in relation to competitiveness

with regard to beneficiation. The interviews further confirmed this result. In both the questionnaire and the interviews, the level of importance in relation to current competitiveness showed room for improvement.

5.2.4 Firm Strategy, Structure and Rivalry

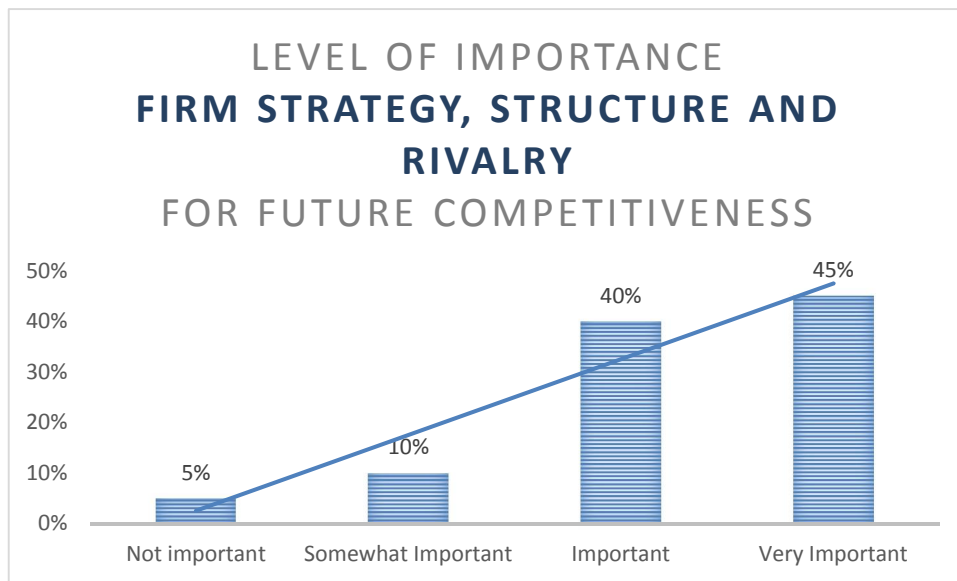
5.2.4.1 Participants' ratings

Figure 14 : Current Competitiveness: Firm Strategy, Structure and Rivalry



Based on the questionnaire of 'firm strategy, structure and rivalry', the current competitiveness in the mining industry, with regard to beneficiation, as can be seen in Figure 14, can be broken down as follows with: 10% of respondents claiming it to be 'very good', 35% saying 'good', 21% saying 'fair' and 20% answering 'poor'.

Figure 15 : Level of Importance - Firm Strategy, Structure and Rivalry



With regard to the importance of 'firm strategy, structure and rivalry' required for competitiveness in the mining industry, with reference to beneficiation going forward, the results seen in Figure 15 showed: 'not very important' (45%), 'important' (40%), 'somewhat important' (10%) and 'not important' (20%).

With respect to the mining industry and the potential for beneficiation, the results show a high level of importance being placed on firm strategy, structure and rivalry. The current competitiveness shows a balance between 'good' and 'fair', with slightly more responses answering 'poor'. Throughout the interviews, respondents identified the various stages of the business cycles and the changes in business strategy, direction and management

5.2.4.2 Interview Results

The interview results below provide some feedback on the reason for the current competitiveness response. The reasoning came down to two main components: large mining houses and oligopolies and the current business cycle being in a downturn.

5.2.4.3 Mining Companies

The South African mining industry is comprised mainly of large mining houses that the participants identified as 'oligopolies'. The pure size, buying power and economies of scale make it very difficult to compete.

'Another problem with the advent of the beneficiation space in South Africa is that South Africa seems to be dominated by oligopoly type structures' (Interview: P16: 08.05.2.14.rtf).

Competition amongst the larger mining houses was noted as being strong and un-collaborative. A great deal of the competition and occasional collaboration in mining companies takes place between smaller- and medium-sized businesses

'...You've got the majors, the mid-years and the juniors and you tend not to compete across the segments ... Now, the junior space, yes, there is quite an active environment. Here, there is quite active competition for projects. It's quite an active market for financing as well in that segment' (Interview: P17: 08.06.1.14.rtf).

Participants also identified that different levels of competitiveness and collaboration can take place within different commodity environments.

'If you talk platinum specifically, it's renowned not to be collaborative because it's monopolised and it's one area that's renowned to not be collaborative' (Interview: P 7: 07.28.2.14.rtf).

'If it's gold in South Africa, it's more collaborative' (Interview: P14: 08.01.2.14.rtf).

A number of participants identified that the surrounding environment often plays a role in the creation of a context which lends itself to the establishing and retaining of collaboration. Since the market crash in 2008 and the recent strikes, the mining industry has become more collaborative.

'I would say that the industry has been more collaborative. Gold and coal (and platinum more recently in the last two years) have been a lot more collaborative. But this collaboration also is sometimes driven by the environment' (Interview: P14: 08.01.2.14.rtf).

'Whereas today in the height of the strike etc, it's become more collaborative. So it just depends on the cycle etc.' (Interview: P14: 08.01.2.14.rtf).

The most significant aspect within this section was the change in management, leadership, company structures and strategies as a result of commodity and business cycles.

'So we're at that part of the cycle where mining companies are not necessarily run by entrepreneurial miners. They are run really by the accounts. It's the cost cutting part of the cycle. Right? Which, to me, is always the bottom of the cycle' (Interview: P 1: 07.21.1.14.rtf).

'I would guess that in a boom phase of a business cycle, you're going to get people who are far less financially orientated, far more around growing the sort of specifics of their particular business. So, the guy who knows the geology can see, he can find the geological opportunity and so on. And then down-turns of the business, you're going to get your accountant-type managers coming in. I haven't seen the data and don't know if this data exists, but, certainly, I would almost bet my house on it that there is a very high correlation between business cycles and management style' (Interview: P 9: 07.30.1.14.rtf).

In a down-turn, changing strategies was a topic raised and addressed, along with the concept of management changes. Cost-cutting and survival are predominant during these times as reflected in the responses.

'It's a difficult one because what I find is that far less long-term strategies are being discussed nowadays, far less. It's far more short-medium term, and, where previously it was all about growth and investment, it's now about what do, how you cut and where, and asking, "Are we as efficient as we can be?"' (Interview: P 7: 07.28.2.14.rtf)

'It's now about where do we improve rather than where do we grow? It's all about margins, retentions of the margins, capital return, sustainability' (Interview: P 7: 07.28.2.14.rtf).

Longevity and stability in the mining companies is often compromised by regular changes in leadership.

'You will see that, in the last three years, in the top forty mining companies globally; there have been nineteen changes to the position of CEO' (Interview: P14: 08.01.2.14.rtf).

5.2.4.4 Mining Company Core Business and Beneficiation

A fundamental question that was raised by many of the participants was, "Should a mine be beneficiating at all"? This query arose in regarding the context of skill set and core business. The economics and skills differ between beneficiation and mining.

'In most instances, I find that companies can't balance between having a producer as well as benefiting. There seems to be always lack of balance in that' (Interview: P13: 08.01.1.14.rtf).

Because of this inability of the two to attain balance and co-exist, there was feedback from some of the participants that miners should be left to mine, and benefiting companies, whose skill is beneficiation, should benefit.

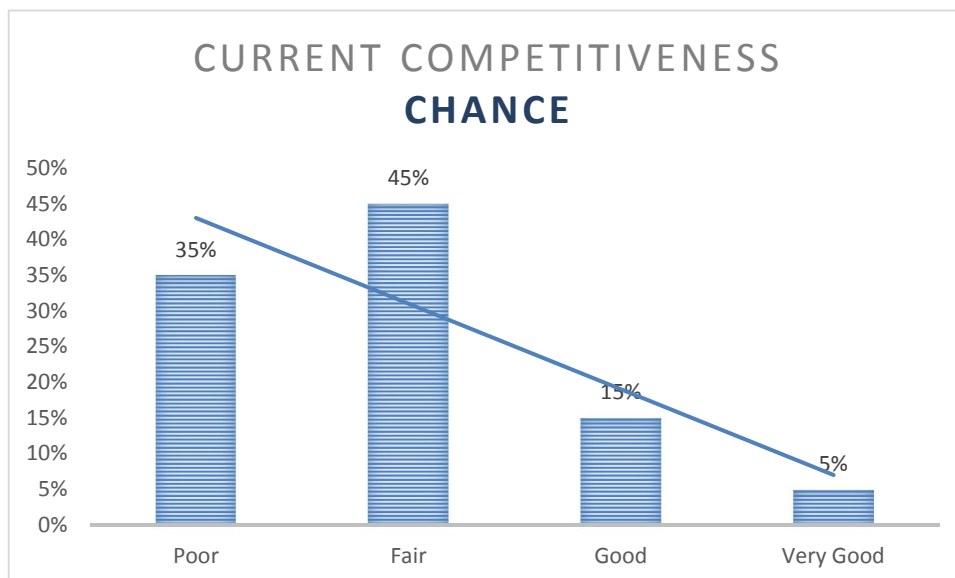
5.2.4.5 Summary of Firm Strategy, Structure and Rivalry

The responses from the questionnaire were mixed and only very marginally negative. The reason for this, based on the interviews, was contingent on the current stage in the business cycle. As the market cycle emerges from the current difficult market conditions; firm strategy, structure and rivalry is likely to change. The understanding of these cycles and the changes in strategy and structure resulted in the future levels of importance being higher than current competitiveness.

5.2.5 Chance/Resilience

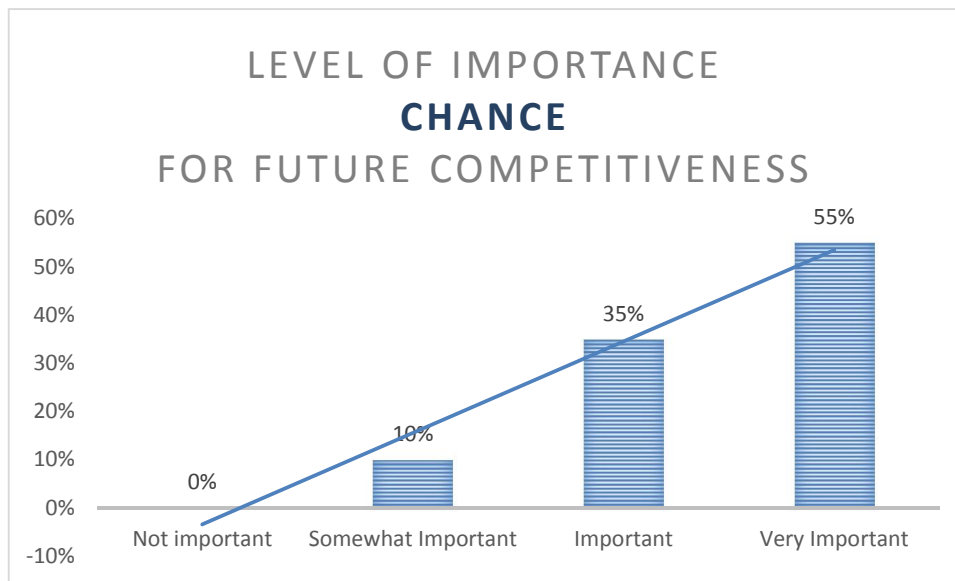
5.2.5.1 Participants' ratings

Figure 16 : Current Competitiveness - Chance



The current competitiveness in the mining industry with regard to chance, as can be seen in Figure 16, in reference to the questionnaire of firm strategy, structure and rivalry can be summarised by the following statistical findings: 'very good' (5%), 'good' (15%) or 'fair' (45%) with 35% respondents answering 'poor'.

Figure 17 : Level of Importance - Chance



With regard to the importance of chance in affecting competitiveness in the mining industry, with reference to beneficiation going forward; the results seen in Figure 17 , showed: 'not very important' (0%), 'somewhat important' (10%), 'important' (35%), and 'very important' (55%).

During the interviews, the terminology of the word 'chance' created confusion amongst respondents due the question implying historical acts of chance being backwards-looking, as well as, more notably, inhibiting a forward-looking discussion. As a result of these issues, discussions centred on sustainability, resilience and innovation. These three subjects facilitated discussion and analysis on the strength of the industry amidst possible chance occurrences.

5.2.5.2 Interview Results

The South African economy at the time of this research was in an economic downturn, following the global market crash of 2008. As a result, the analysis of chance occurred during an unpredicted and unavoidable event. It also provided significant relevance to analysing resilience and sustainability as these assist with surviving chance events.

'... Capacity to see out the long cold winters ... capacity to see through the challenges that confront you ... the willingness, the capability, the steady determination to continue to work on trying to get things right even though you may face obstacles that appear to be insurmountable. You know, so resilience has many different ... has a number of different interpretations and views. The

mining sector has always ... has obviously been the flywheel of South Africa's economy for much of the last one hundred and twenty years. So it's an industry that has exhibited a degree of resilience, which a number of other sectors have not exhibited. Our risk factors are exchange rates and price dictation' (Interview: P 6: 07.25.1.14.rtf).

Resilience, according to many responses, is deemed synonymous with survival and being strong enough to outlast your competitors and less durable companies.

'You must go and see where you are in the cost curve and that's why it's not a chain – each component of that must be competitive. So, if the mine is competitive on a cost basis to all the other iron ore mines in the world, fifty percent of the mines in the world are going to close down before this one' (Interview: P10: 07.302.14.rtf).

The financial system, as described earlier, provided a level of cushioning against the market crash. However, there were debates surrounding the need to diversify from reliance and a move to focus on only a few areas in the mining industry. There was a discussion surrounding the dependence on raw material and that beneficiation will result in resilience.

'I think we're very exposed. I think the only guys that are resilient, seriously, are the guys that are beneficiating' (Interview: P 6: 07.25.1.14.rtf).

A key issue raised, with regard to diversification and resilience, was the status of research and development in South Africa. A number of the respondents stated the need to innovate, for competitiveness and for survival based on evolving technologies globally and locally. As noted earlier, the stage in the business cycle was a key factor, having a profound effect on the support and spend on research and development.

'The unfortunate part, because of cost-cutting measures mainly; the mining companies have cut costs on research and development. They are not doing research, which is unfortunate to an extent. We are importing in terms of mechanisation. We import everything' (P13: 08.01.1.14.rtf).

'Things change, technologies change, market opportunities, consumer behaviour changes and I think that you can't just learn statically. You've got to learn and grow, which means you have to evolve the concept and I don't think we've evolved the concept. So, we seem to think that the kind of things that worked in

the past are going to work in the future and that's a false assumption' (Interview: P20: 7.21.3.14.rtf).

5.2.5.3 Summary of Chance/Resilience

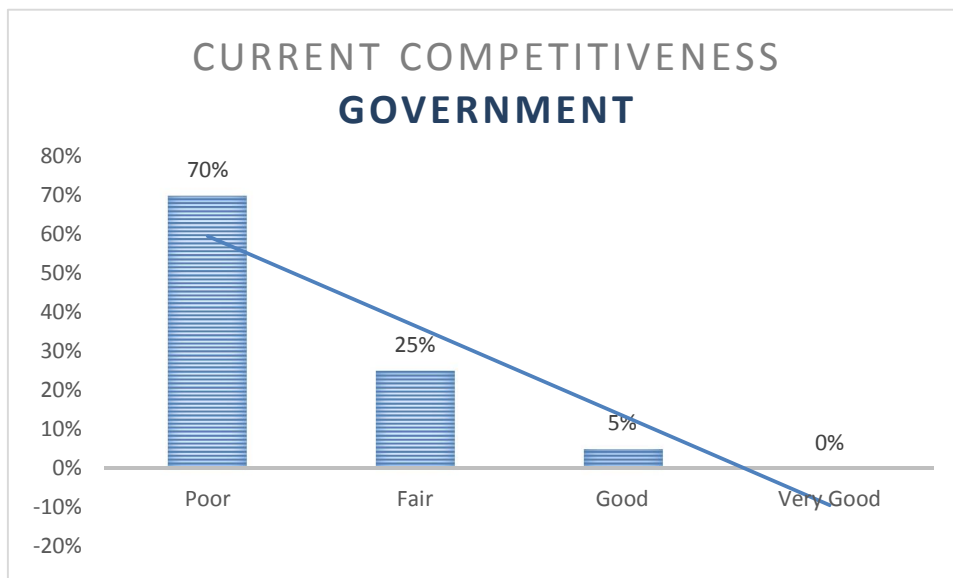
Chance is an event you cannot predict, and is hence is something difficult to plan towards. A chance event could be the market collapse, which is an event that the mining industry is currently in; or could even be a natural disaster. The participants saw three main ways, based on their own business scenarios, by which to combat potential chance events. These are: diversification to avoid shocks to any specific commodities; innovation and research and development; and financial strength to enable concerns to sit out competitors who fail before you.

5.2.6 Government

Along with labour and electricity, the issue of government was one of the top ten impediments to growth that was raised.

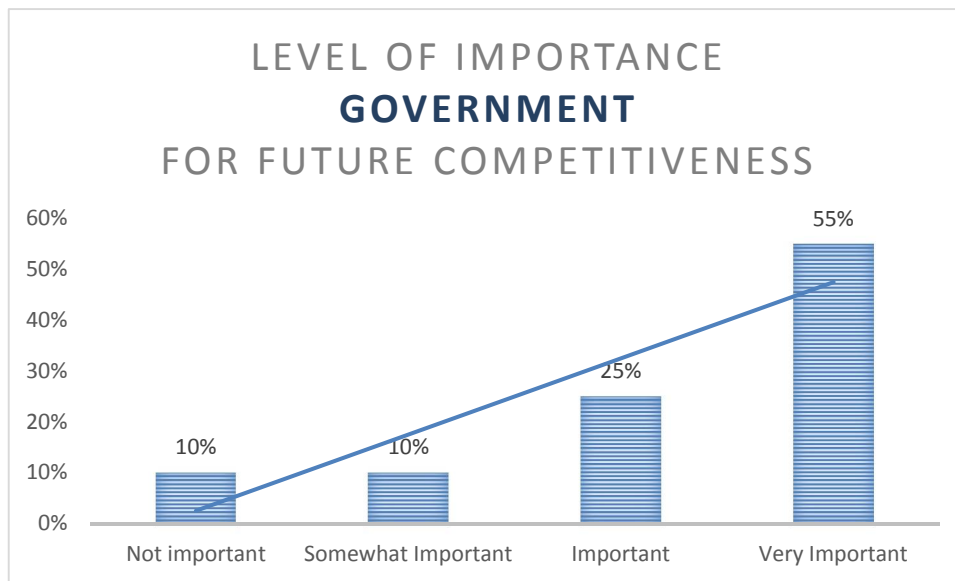
5.2.6.1 Participants' Ratings

Figure 18 : Current Competitiveness - Government



With reference to the questionnaire of government, the current competitiveness in the mining industry, with regard to beneficiation, as can be seen in Figure 18 , can be summed up as follows, with: no respondents saying 'very good', 5% answering 'good', 25% 'fair' and 70% of respondents answering 'poor'.

Figure 19 : Level of Importance - Government



With regard to the importance of the government's relevance to enabling competitiveness in the mining industry, with reference to beneficiation going forward, the results seen in Figure 22 showed: 'not very important' (55%), 'important' (25%), 'somewhat important' (10%) and 'not important' (10%).

As can be seen from the above, the current status is predominantly 'poor' and the level of importance the antithesis. The interviews provided a great deal of insight into this and the explanation for choices from a number of participants provided elucidations for this.

5.2.6.2 Interview Results

The issue of government in this research proved the most heated of all debates as respondents had very firm views.

Various government strategies, policies and regulations, as detailed in chapter one, have resulted in the fostering of predominantly negative views on South Africa. The researcher asked each participant about some of the core government documents which have relevance to beneficiation. A number of the policies were known by the respondents, however, the majority they were unfamiliar with. Those that did not know the policies stated that they had no interest in reading them, and the parties had cognisance of these highlighted the ambiguity and contradictions in the various documents. One of the key areas highlighted was the lack of inter-departmental congruency.

'Well, there's the same voice to the extent that all agree that there is a need for beneficiation, but the voice splits over the details' (Interview: P 13: 08.01.1.14.rtf).

The responses showed some positivity towards the government's intentions and their drive towards beneficiation.

'I can see in all the areas they are trying. So I think the issue is that they recognise they need to create this environment, but are not there yet' (Interview 2: 07.21.2.14.rtf).

The negative responses, however, far outweighed the positive ones.

'Lack of risk capital is because most money that gets poured into it just gets lost, because of, you know, corruption in departments, the time it takes to issue permits, the lack of clarity. I mean there is a whole world of issues there.' (Interview: P 2: 07.21.2.14.rtf)

'Unfortunately, in South Africa you have all these regulations that are driving beneficiation away rather than bringing it forward' (Interview: P 7: 07.28.2.14.rtf).

'Okay. I mean the short answer is that government can't just flick a switch and decide we want to beneficiate, and, to the extent that they can, I think that our government (and in fact most governments around the world) does not understand the economics, and doesn't really understand the economics of beneficiation, in my opinion' (Interview: P 9: 07.30.1.14.rtf).

The general feedback about whether beneficiation should occur in the mining industry in South Africa was positive, but was, however, something that should be subject to a number of conditions. It should also not be a forced solution. Government should therefore minimise the red tape and help create an enabling environment. This is all contingent on whether: there is demand (local and/or international), competitiveness, and the economics stack up.

5.2.6.3 Summary of Government

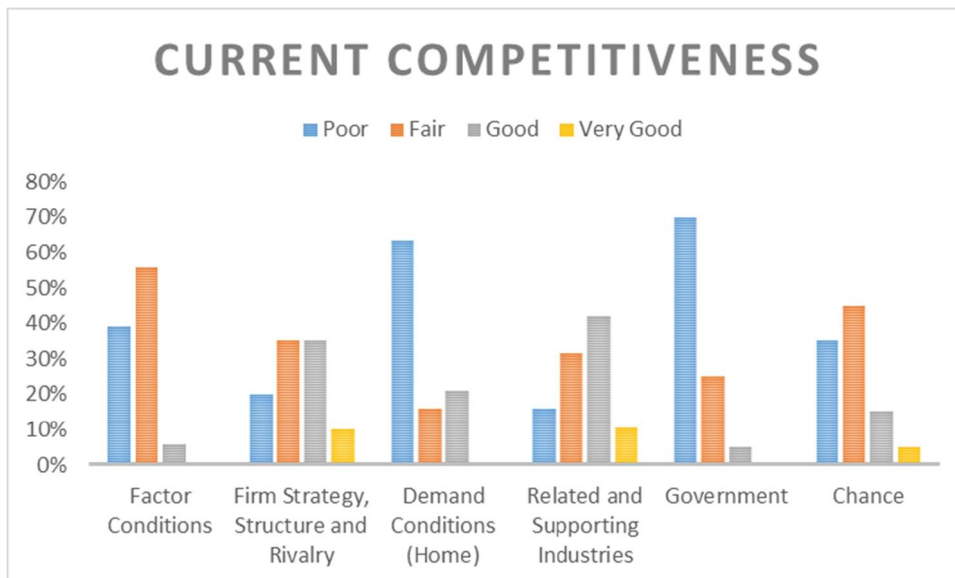
The majority of the responses towards government's current support was negative. Their involvement in the mining industry, red tape and intention to create laws were all deemed forceful in compelling mining companies to beneficiate. The concern of industry was that an enabling environment was not in place to ensure competitiveness. There was also concern with regard to the policies and strategies planned by the government not being appropriate for beneficiation as well as the fact that there was no one department taking control of the planning.

The individuals who said government was important predominantly did so as they wanted government to play a supporting role in getting infrastructure sorted out. The others said government was not important as they did not want government interference.

5.3 Summary of Results

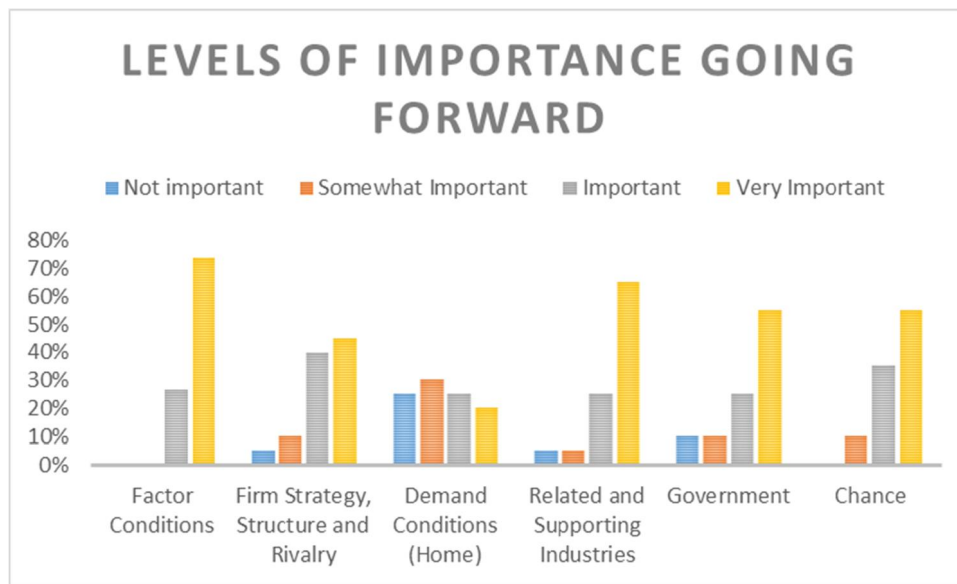
Putting all the aspects of the Diamond Model together in one graph provides a holistic view of current competitiveness. This also illuminates the levels of importance placed on entities, facilitating going forward. Most importantly, it visually demonstrates the difference between the two.

Figure 20 : Current Competitiveness Summary



When analysing the chart reflecting current competitiveness in Figure 20 , the amount of responses identifying this present situation as 'poor' is significant in comparison to other responses. This statistic is then followed by a substantial proportion deeming it to be 'fair'. This clearly shows that current competitiveness in the mining industry is very negative.

Figure 21 : Levels of Importance Summary



In Figure 21 , which compares levels of importance placed on competitiveness in the future, it is apparent that the level of importance of attaining this is considered 'very important' in the same areas that were identified as 'poor' based on current competitiveness (Figure 23). The interviews provided more detail. The questionnaire and the questionnaire answers were aligned in all aspects of the Diamond Model other than that of demand.

As a result of globalisation, the size of South Africa and its resultant home demand, and the quality and volume of minerals produced, was addressed in this chapter. It was found that the home demand was not sufficient in comparison to its mineral production and international demand. It was highlighted that although local demand may be relevant in certain circumstances and business models; it was not suited to the mining industry in South Africa, specifically with regard to potential beneficiated material.

Chapter 6 – Discussion of Results

6.1 Introduction

In this chapter, the results from chapter five will be discussed and analysed together with the literature from chapter two. The aim of the research was firstly to analyse competitiveness in the mining industry in order to establish whether it provided sufficient support for beneficiation of the South Africa mineral resources under current economic and country circumstances, and, secondly, what is required to make the industry competitive enough to beneficiate going forward.

During the research and interviews, it became clear that there were some areas within the Diamond Model that did not suit a developing, dynamic and industrialising economy such as South Africa. It was also identified that the model was more suited to a historical or point in time analysis. This resulted in two additional aims: firstly to interrogate Porter's Diamond Model and establish its applicability at the time of research as well as its relevance to dynamic markets; and, secondly, whether a new model could be created with the elements used by Porter in the Diamond Model and be used to assist strategy design for new and existing industries going forward.

The outline of this chapter will be broken up into two sections. The first section will analyse research question one and research question two, that is, the current and required competitiveness of the mining industry. The second part will look at research question three and analyse the Diamond Model with the intention of confirming or disputing the relevance to the South African mining industry's competitiveness with specific reference to beneficiation. The aim of the fourth research question will be to assess and attempt to redesign the Diamond Model to suit a forward-looking strategy design model.

6.2 Context

There are a number of factors in the surrounding environment that impact the model and the dynamics of the mining industry in South Africa. As discussed, the model cannot be assessed in isolation, and the surrounding environment needs to be understood before narrowing the assessment down to the model alone. These factors are influencers in the South African mining industry and are included to gain more understanding of the context of the analysis. The literature, with regard to the context detailed in chapter two, will be raised again in this chapter with regard to respondent's agreements or disagreements with the theory.

6.2.1 Resource Endowment and Comparative Advantage

The majority of the participants in the research agreed that South Africa had significant resource endowments and a comparative advantage when it came to mineral resources. They did, however, raise a concern that, while this comparative advantage did exist, this did not mean that the resources, or indeed the beneficiated material, was competitive on a global scale. They also acknowledged the high level of raw material being exported without any value addition. G. Davis and A. Vásquez Cordano (2013) warn against this as leading to low productivity and sensitivity to commodity booms and crashes. Based on participant feedback, this warning was one that proved valid in the South African environment, as both productivity and sensitivity to commodity cycles were found to have significant negative effects on the mining industry at the time of this research.

A number of possible solutions have been discussed in literature. Examples include export diversification in some cases, and export specialisation in others. Both of these options are often based on comparative advantage (Alwang & Siegel, 1994). In the case of this research, the predominant feedback was diversifying and moving into more value-added material. However, the decisions need to be made based on competitiveness and positive economics.

6.2.2 Globalisation

Globalisation proved a significant part of this research. South Africa is a global player in the mining environment, and, most notably, in the export of raw materials. As per the participant's feedback, South Africa does not have a large enough market to consume all of the minerals produced. As a result, global sales provide a significant amount of mining companies' sales. Morrissey and Filatotchev (2001) defined globalisation as networks of interdependence at multi-continental distances. This interdependence and reliance on certain export partners has been seen as a concern for sustainability in the longer term. As outlined in the feedback from the respondents and literature, sustainability was raised as being one of the reasons for beneficiation and diversification.

6.2.3 Industrialisation and Industrial Policy

As outlined by Vera (2013), industrialisation can be described as a form of structural change resulting in a change of the makeup of an economy. The industrialisation plan put in place by the South African Government is an example of this. The intention of the government is to change the economy from an exporter of raw minerals to that of an

exporter of value-added minerals through beneficiation or manufacturing, a strategy promoted by Lin (2013). Feedback from the participants stated, that, in order to do this, there needed to be an enabling environment, which was not yet available in the South African environment.

The market crash in 2008 was outlined as having had a significant impact on the country's economy and the resultant strength and competitiveness of the mining industry. The effects of this calamitous event, could, however, have been cushioned should the government and mining industry have taken greater advantage of the strong economic period prior to the crash. Chandra (2004) stated that, while some countries benefitted from globalisation, there were many developing countries that did not. It was made clear in the majority of the interviews that South Africa was one of these developing countries that did not take advantage of globalisation and the strong market.

Rodrik (2008) raised two objections to industrial strategy, both of which are evident in South Africa's industrialisation and beneficiation strategies according to the participants in this research. Firstly, informational objection, which states that it is impossible for governments to identify (with any degree of precision and certainty) the relevant firms, sectors, or markets that are subject to market imperfections that should be adjusted, such as the export of raw materials. The second objection is that industrial policy is an invitation to corruption and rent-seeking.

These concerns were raised by participants with specific reference to selecting appropriate, profitable industries on which to base a significant part of the industrialisation strategy. This research focuses on the mining industry with specific reference to beneficiation. This study also requested participants to select various value chains, which they, in many cases, found confusing as these required vastly different enabling factors.

6.2.4 Beneficiation

The feedback from the respondents was that, even with the support of local industry, pricing should be both locally and globally competitive, and any local manufacturing industries should not gain competitiveness at the expense of the mining industry's competitiveness. Zhang and London (2013) stated that, regardless of which industry, in this context beneficiation or manufacturing, the competitiveness is the determinant of success or failure of any industry as globalisation and internationalisation have increased competition.

The respondents raised this as a key concern, as, should beneficiation go ahead, the inputs from the mining industry need to be competitive themselves in order to make competitiveness possible. If the enabling environment is not in place and the competitiveness of the mining industry insufficient; beneficiation will not be possible nor will the resultant products be able to compete in the global market.

6.3 Competitiveness Analysis

The analysis of each element of the model will be discussed alongside Porter's reasoning for each element. This investigation seeks to provide the answers to the research question which will follow thereafter.

6.3.1 Factor Conditions

Porter (2011) stated that factor endowments lie at the centre of traditional competitive theory. Based on the 21 interviews, factor conditions proved to be the central issue to competitiveness in the South African mining industry.

Figure 22 : Current Competitiveness - Factor Conditions

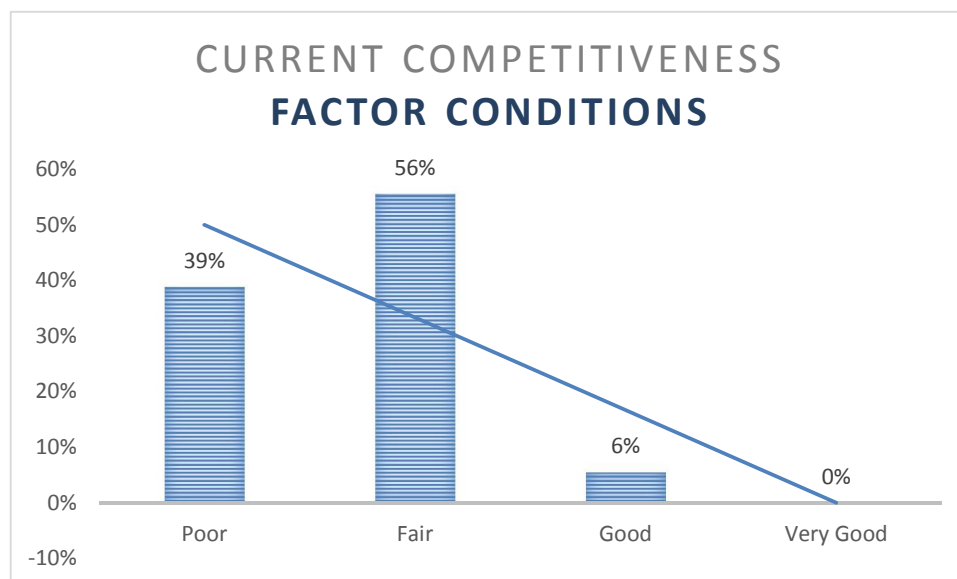
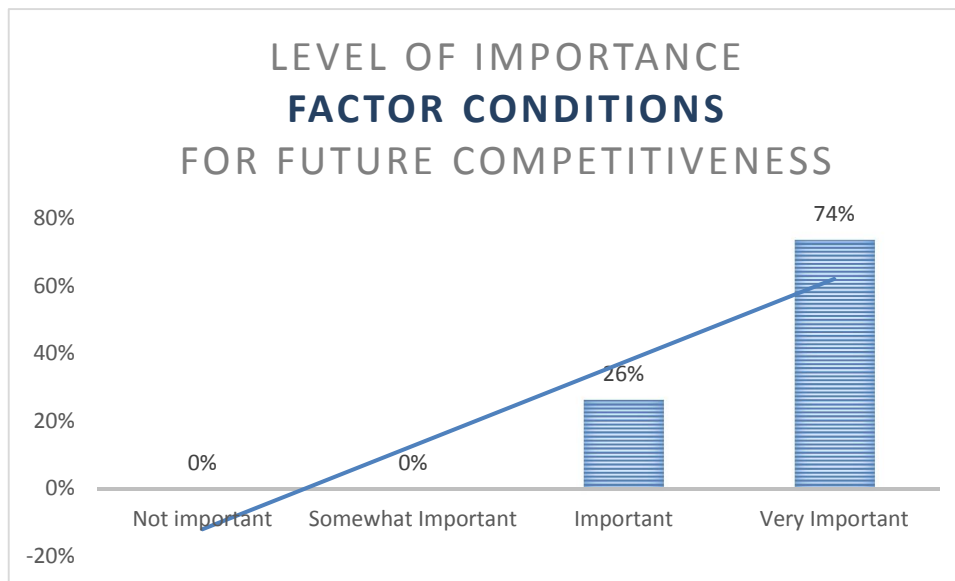


Figure 23 : Level of Importance - Factor Conditions



The results, as can be seen in Figure 22 and Figure 23 above, which were confirmed in more depth in the interviews, describe the current competitiveness of factor conditions in the mining industry to be negative, and, by extension, the importance of factor conditions going forward to be very important. The negative view of the current factor conditions shows that present levels of competitiveness are insufficient and need to be addressed. The more positive trend demonstrates that the respondents viewed factor conditions as important. Thus, it is widely regarded as a vital element to catalysing and sustaining competitiveness, and, as a result, needs to be addressed urgently. Further to this, the level of importance allocated to it reveals agreement with Porter in the inclusion of factor conditions as a key element of his model.

6.3.1.1 Infrastructure

The respondents found this aspect of factor conditions to be one of the major stumbling blocks to competitiveness.

6.3.1.1.1 Power

Kohler (2014) outlined high energy usage to be a component of the country's comparative advantage. He raised further concern regarding mining and industrial electricity efficiency. In addition to this, Moeti (2013) highlighted the problem of securing availability of reliable and affordable sources of electricity. These concerns were echoed by the respondents, further compounding the negative feedback on current conditions. An additional concern was raised regarding the capabilities of the national power

producer, Eskom. A lack of faith in their ability to deliver the required power – and their doing so in a reliable, efficient and affordable manner – was evident as noted above by Moeti (2013) and Kohler (2014) .

6.3.1.1.2 Transport

The requirement of infrastructure, and its being different for all commodity chains as raised by Morrissey and Filatotchev (2001), played a significant role in arriving at the results of this research. The interviews consisted of parties representing both high value/low volume and low value/high volume commodities, with each commodity chain having very different requirements. Respondents representing high volume materials are a great deal more cost sensitive and relied on road, rail and port facilities. Rail and port facilities were identified, as with electricity, as being state-owned, and, as a result, subject to suffering significant bottlenecks. High value material has the ability to absorb higher transport costs and does not have the same constraints as high volume material. Despite these differences in transport requirements, the results reflected similar opinions, albeit from different points of reference.

6.3.1.2 Human Resources

6.3.1.2.1 Skills

M. Rossouw and R. Baxter (2011) raised concerns regarding skills in South African mining and manufacturing, specifically with respect to the transferring of skills with regard to a beneficiation strategy. The skills required for mining and those required for higher value adding activities are, however, needless to say, vastly different. The respondents raised similar views with regard to the skills component in the industry. Basic education was, however, their largest concern which was highlighted in the pronounced negative weighting of this in the factor results. It was established that, in order to move to a more mechanised beneficiated model, skills would need to be transferred to a different discipline. The respondents agreed with this, but stressed the fact that these skills would need to be based on a sound education system to provide the foundation for the acquisition of thereof.

6.3.1.2.2 Labour

Porter (2011) identified the importance of labour, but did not detail the issues that the participants stressed had a profound effect on the South African mining industry. These included unions and striking labour. The majority of the respondents stated that striking

action was a significant issue with regard to not just wage issues, but also productivity and safety. The coverage of strikes in the media was also raised as being problematic in that this exposure negatively affects international investors' perceptions of South African mining, resulting in their concomitant hesitancy to invest. Both education and labour were seen as significant parts of, and inputs into, the mining industry, the inadequacies thereof adding weight to the present negative competitiveness rating. Participants also identified these two factors as key to competitiveness going forward.

6.3.1.3 Physical Resources

As outlined in 6.2.1, respondents agreed that South Africa had a comparative advantage in minerals. This advantage did not, however, refer to all resources outside of actual mineral endowments. Porter (2011) outlined that physical resources also referred to the abundance, quality and accessibility of water resources, as well as country location and the effect on logistics costs and distance to markets. The participants in this research raised concerns about the availability of water and the cost effects of South Africa's distance to a number of markets – most specifically in relation to country location, freight costs were raised as being an issue.

6.3.1.4 Capital Resources

Porter (2011) identified capital as the cost and availability of funds able to finance the industry. Based on the results from the previous chapter, this was also identified as being a key factor in the competitiveness of the industry. Opinion here vacillated with a number of respondents noting the need to look for capital offshore, while other respondents stating that funds were available in the country. Analysing the response, it can be seen that there is funding available, but it is either very difficult to get access to or prohibitively expensive. Beneficiation plants are extremely capital intensive and the availability and cost of funding reduces the feasibility significantly.

6.3.1.5 Knowledge Resources

Porter (2011) identified these resources as scientific, technical and market knowledge residing in locations such as universities, research institutes (government and private) market research and other such locations. Based on the interviews, there were some contrasting views on the presence and availability of these resources. The issue of poor base education was brought up again as an inhibitor to the establishment of strong knowledge resources. The lack of sufficient research and development facilities provided by government was likewise identified as a key issue. Based on the downturn stage in

the business cycle, research and development, within local private institutions, was not sufficient, mainly due to capital constraints.

6.3.2 Demand Conditions

Figure 24 : Current Competitiveness - Demand Conditions

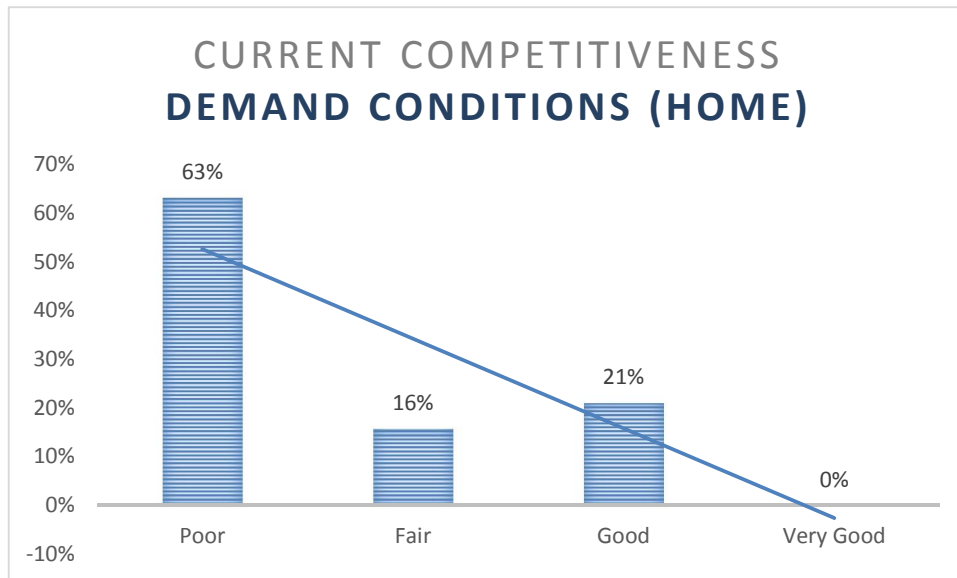
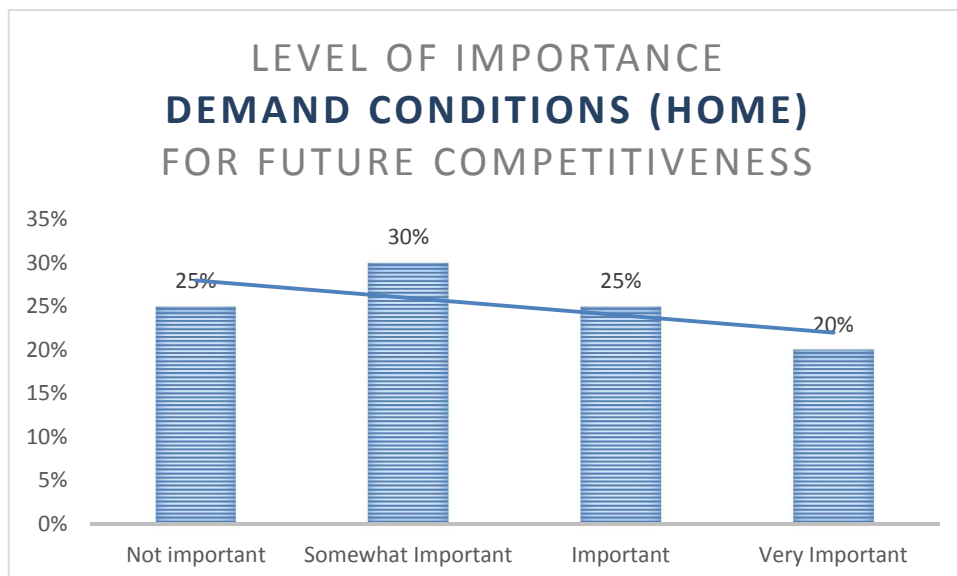


Figure 25 : Level of Importance - Demand Conditions



Globalisation, as outlined in 6.2.2 of this chapter, plays and continues to play a significant role in the demand conditions of the South African mining industry and potential beneficiated material. G. A. Davis and A. L. Vásquez Cordano (2013) outlined the change in trade dynamics during industrialisation, from the export of raw material and

import to more internal consumption of raw materials and export of manufactured. With regard to demand conditions Porter's model does not necessarily suit the South African environment.

Porter (2011) used Japan as a case study for the Diamond Model, illuminating how Japan's industrialisation and economy boomed during the 1980s and 1990s. In the case of Japan, their growth occurred subsequent to World War II, after which a great deal of rebuilding was required as buildings had been destroyed. The country had to build up its steel production, for example, and build ships in order to overcome locational issues to trade. In their case, there is a market for beneficiated material internally.

Applying this to South Africa, the majority of the participants stated that the lack of home demand and size of South Africa did not provide a big enough market for the minerals. A number of the participants did identify home demand as core to business. However the general sentiment, although slight, as can be seen from Figure 28 above, was predominantly that this was 'somewhat important' and reveals a negative trend line.

6.3.3 Related and supporting industry

Figure 26 : Current Competitiveness - Related and Supporting Industries

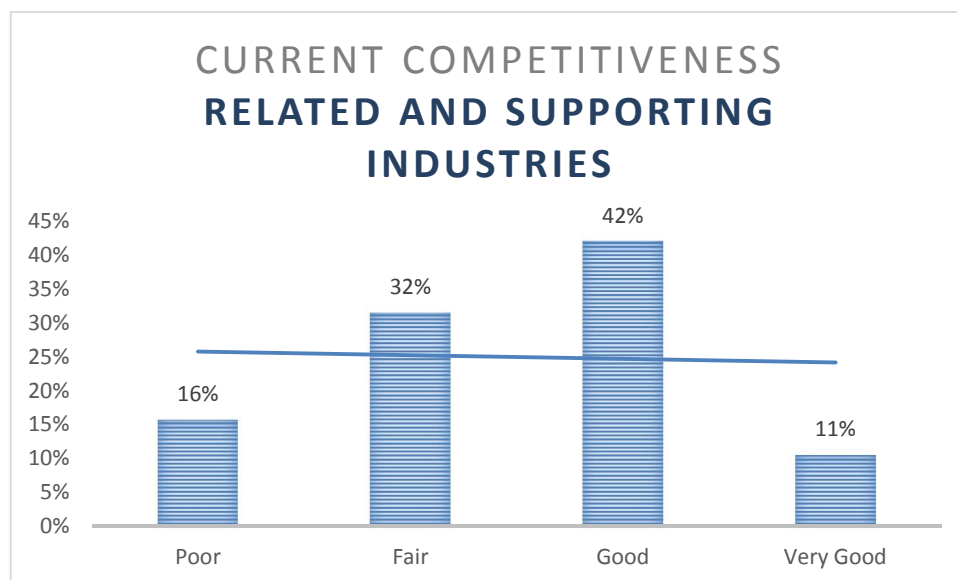
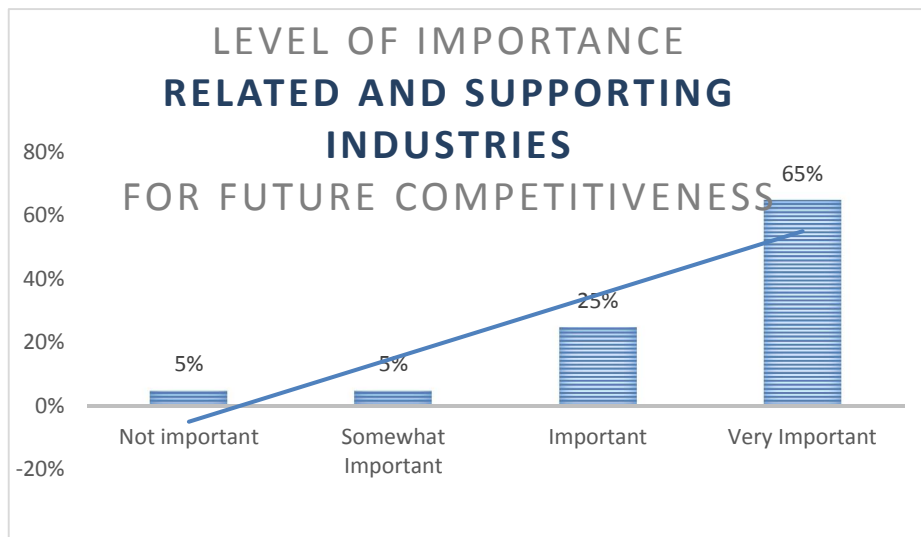


Figure 27 : Level of Importance - Related and Supporting Industries



Porter (2011) viewed related and supporting industries as a core component of the Diamond Model. His belief was that an industry is made up of clusters that form within the economy. These clusters are comprised of related and supporting industries providing the inputs and support in the industry, thereby assisting and driving greater competitiveness. As can be seen in Figure 26 the participants were mixed in their responses to the current competitiveness of related and supporting industries, however they agreed with importance allocated to it as can be seen in Figure 27 . The current competitive results, while not as extreme as some of the other elements, were only slightly negative which shows the view that there were aspects within the element that were seen as positive.

6.3.4 Firm Strategy, Structure and Rivalry

Figure 28 : Current Competitiveness - Firm Strategy, Structure and Rivalry

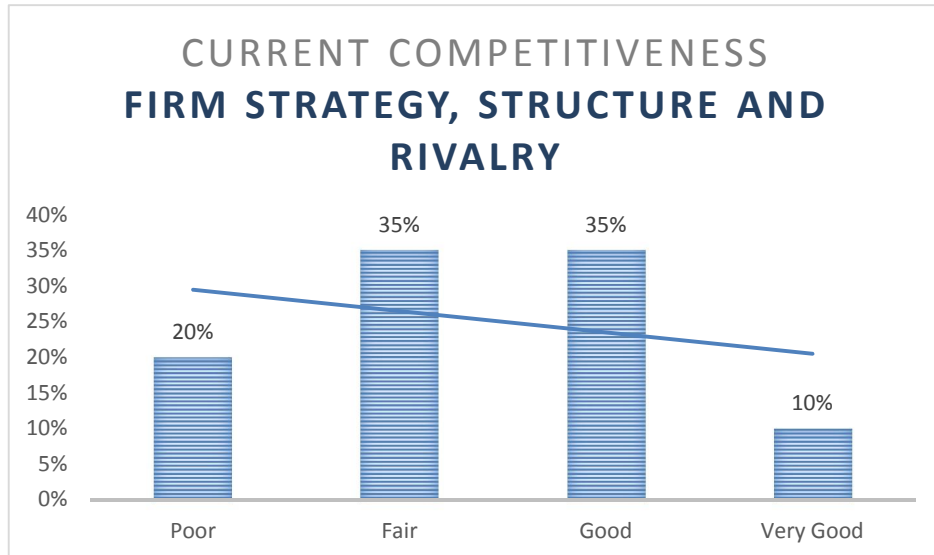
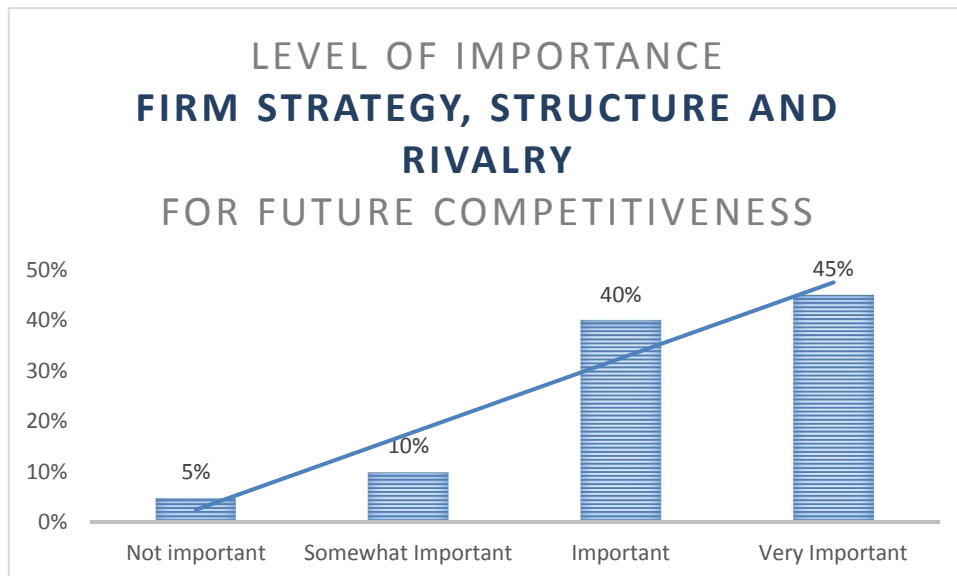


Figure 29 : Level of Importance - Firm Strategy, Structure and Rivalry



Chatain (2013) states that an industry is large and each firm will only have a subset of the development opportunities. Participants, however, strongly disagreed with this statement. Respondents held the view that one of the main barriers to competitiveness was the presence of large oligopolies controlling the majority of the industry. Ruffin (2003) believes that this is changing and new entrants are beginning to play a more significant role. This may provide an explanation as to only a 10% leaning towards poor in Figure 28 . Although some participants agreed that the dynamic of firms entering the

market has changed, they asserted that there are still constraints prohibiting them from doing so.

The second significant issue participants drew attention to, but was not something discussed in detail by Porter, was the dynamic of company leaders, strategies and management and sensitivity to business cycles. A number of the participants debated the changing dynamics of leadership from management and the effects thereof. It was identified that, during market stress, management shifts from traditional leadership (based on building businesses and creating new opportunities) to cost-cutting and down-sizing, and this is often run by financial people. This frequently shifts back once the cycle changes again. A high level of importance was attributed to this element as can be seen in Figure 29 .

6.3.4 Government

Figure 30 : Current Competitiveness - Government

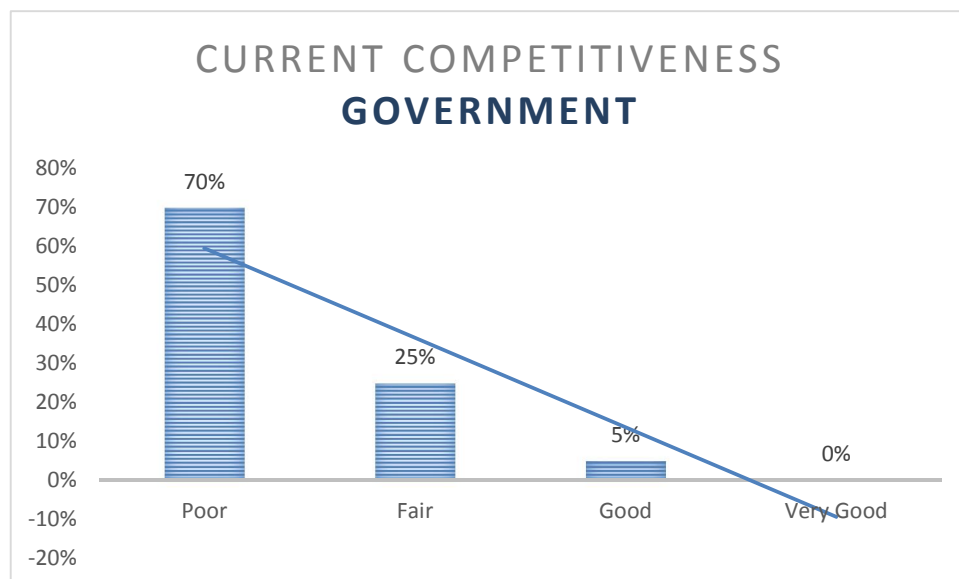
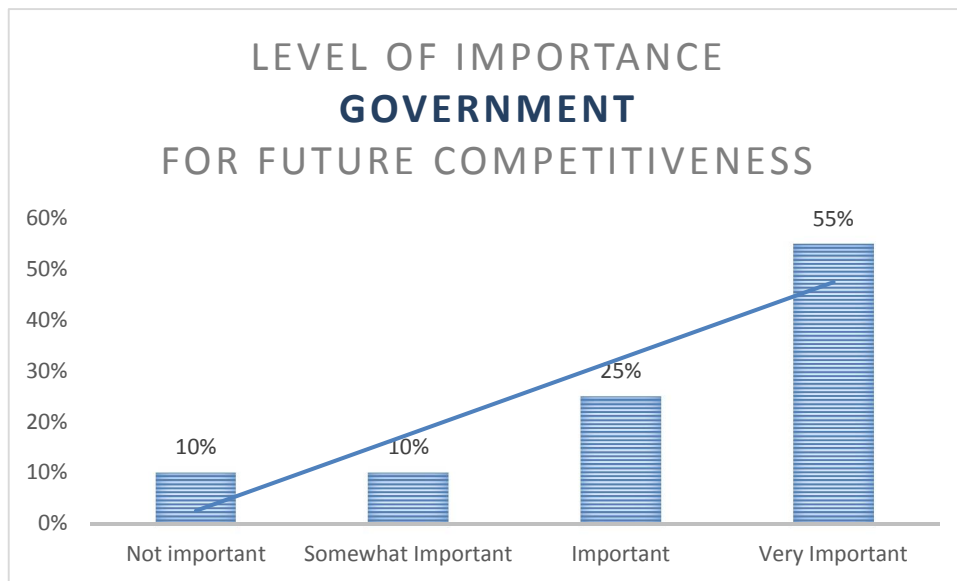


Figure 31 : Level of Importance - Government



Porter (2011) regarded government as an influencing factor rather than as a core element. This is not a belief held in all literature. Lin (2012a) sees government as the most important institution in an economy. Zhang and London (2013) conducted research, specifically on the Diamond Model, to analyse the role of government. Their results state that government should be included as a core element and not only as an influencer. Participants' responses varied in the required role of government going forward. The responses fell into three main categories, those advocating:

1. High government involvement in order to create and maintain an enabling environment without involvement in the industry;
2. No government involvement;
3. Complete government involvement and control.

Based on the results above, government is seen as highly important, as seen in Figure 31, which is in alignment with Zhang and London (2013) who asserted that government should play a pivotal role rather than be a mere influencer. The level of importance may be a result of the extreme level of negativity, shown in Figure 30.

6.3.5 Chance

Figure 32 : Current Competitiveness - Chance

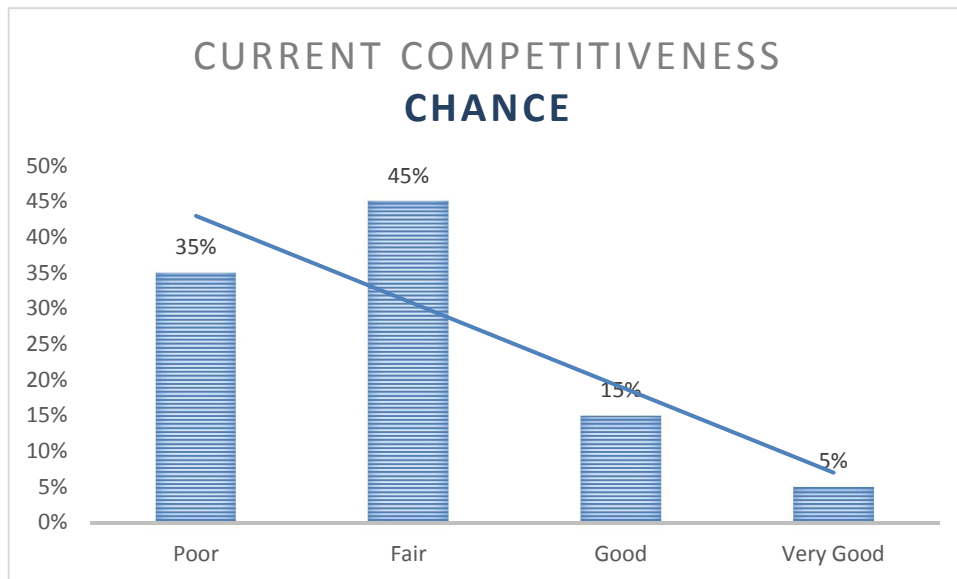
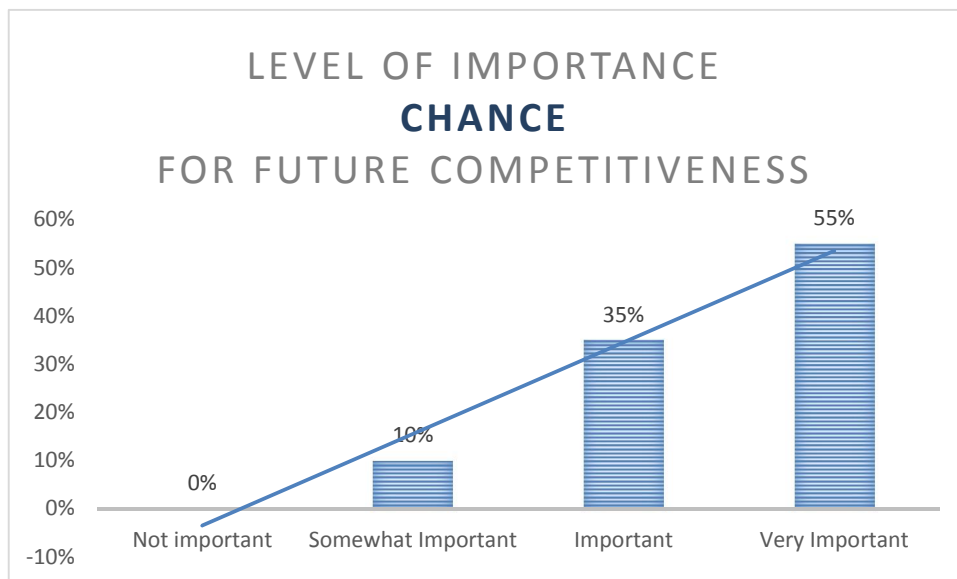


Figure 33 : Level of Importance - Chance



Chance events can significantly change and industry and country. In the case of South Africa, examples of this are apartheid and sanctions, the market collapse in 2008 and the like. One will never know when a chance event is about to transpire.

The element of chance was mentioned in chapter 2, and expounded on in chapter five. In order to discuss the Diamond Model, the word 'chance' was amended to 'resilience and sustainability'. This helped specify and define the term more succinctly in order to conduct the interviews in a present and forward-looking manner. As a result of difficulty with the mining sector and its perceived resilience after the market crash in 2008,

participants were concerned about the resilience of the mining industry, graphically represented in Figure 32. The current difficult conditions proving an example of the need for greater focus on creating greater resilience, the importance of this can be seen in Figure 33 .

6.4 Research Question One

The competitiveness of each segment was determined by the questionnaire result trends and interview responses. Demand conditions within the Porter Diamond Model refer primarily to local demand (Porter, 2011). In the case of the South African mining industry, the respondents focused on both international and domestic demand. Based on the Diamond Model, demand conditions would be fair/poor, but, based on international demand, they would be good/very good. The only element that has a slight level of competitiveness is that of the related and supporting industries.

As the model is mutually reinforcing and all elements need to be competitive. If one element differs, this changes the dynamic of the model and, by implication, its competitiveness. As can be seen below in Table 1 , the majority of the elements are uncompetitive.

Table 1 : Research Question One Results

Research Question	Diamond Segment	Competiveness Result
Is the South African mining industry sufficiently competitive to provide an enabling environment for successful mineral beneficiation based on the Diamond Model?	Factor Conditions	No
	Demand Conditions	No (<i>International – yes</i>)
	Related and Supporting Industries	Yes - slightly
	Firm strategy, structure and rivalry	No
	Government	No
	Chance	No

Therefore, based on the interviews and the questionnaires, South Africa’s mining industry is not sufficiently competitive to provide an enabling environment for successful beneficiation at this point in time.

6.5 Research Question Two

The results show significant differences and disparity in and between current competitiveness and what is required for future competitiveness. The results also reflect that the strength of the answers for each element imply a drive for the model being mutually exclusive in its design. As with research question one, the anomaly found was

that of demand. With regard to local demand, which was specified in the questionnaire, the response was that it was not significant as evidenced by the results below. Considerable emphasis was, however, placed on international demand.

Table 2 : Research Question Two Results

Research Question	Diamond Segment	Competitiveness Result
What is required to be sufficiently competitive to provide an enabling environment for successful mineral beneficiation based on the Diamond Model?	Factor Conditions	Yes
	Demand Conditions	No (<i>International - yes</i>)
	Related and Supporting Industries	Yes
	Firm Strategy, Structure and Rivalry	Yes
	Government	Yes
	Chance	Yes

Based solely on Porter's Diamond Model, and as outlined in Table 2 above, the following elements are required to sufficiently provide and enabling environment for competitiveness and beneficiation are:

- Factor Conditions;
- Related and Supporting Industries;
- Firm Strategy, Structure and Rivalry;
- Government (Influencing Factor);
- Chance (Influencing Factor).

**Home focused demand was the only element not included above.*

6.6 Research Question Three – The Relevance of Porter's Model

Based on the positive trends evidenced throughout, all but one element showed that the elements within the model appear valid in the mining industry in South Africa. Demand was the only element that showed a slightly negative trend. This negative trend could be attributed to a result of globalisation and/or greater focus being placed, by the participants, on international markets rather than just domestic.

Thus, the research shows that there is validity represented in Porter's Diamond Model, should the demand element be restructured to include international demand as a core component together with local demand, rather than just as a by-product of it. Chance is an element that caused significant confusion as it is clear that chance can affect everything. In addition, these inescapable and unpreventable chance events did not prompt any forward-looking discussions and the desire to implement ways to strengthen

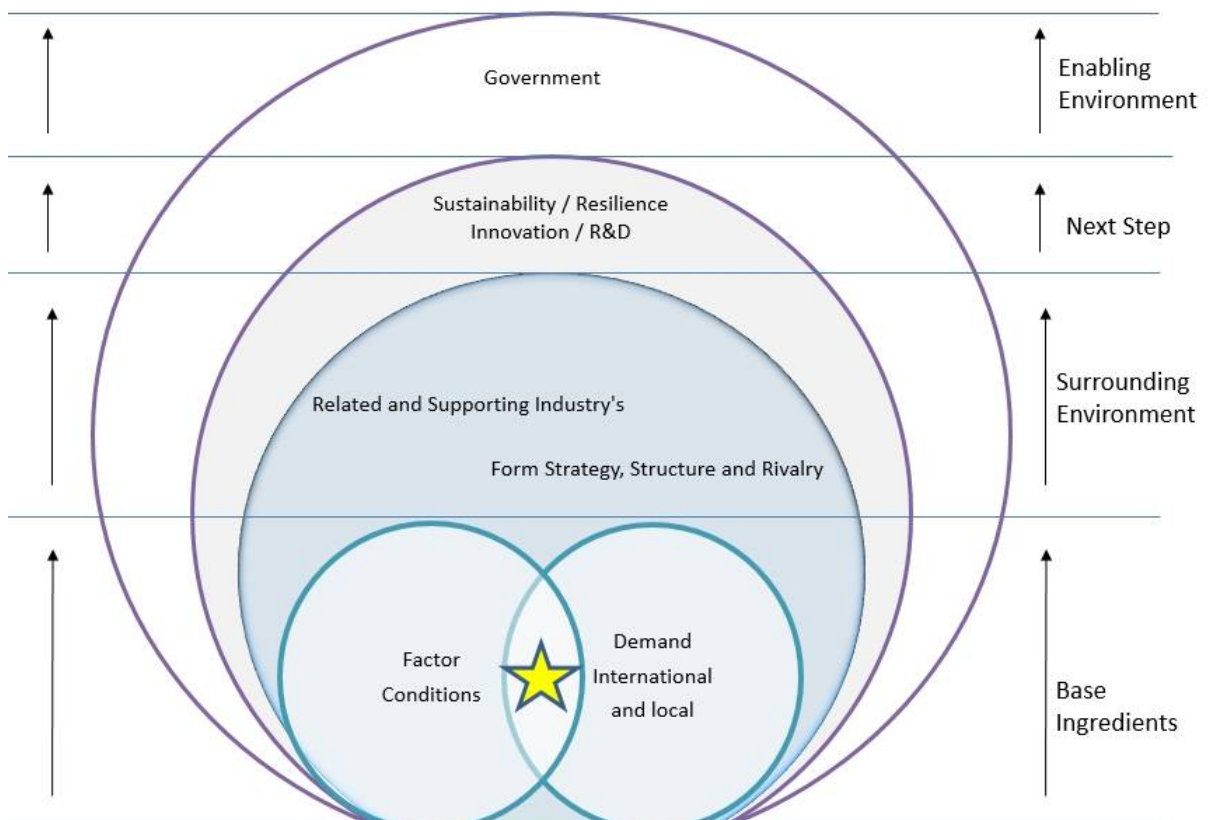
and guard against these occurrences, including them in the business model as a strength and not a drain.

Based on the positive importance levels, it demonstrates that there is relevance to Porter's Diamond Model. Based on the research, should the model remain structured in the same way, demand should now include international demand and sustainability, research and development and innovation replacing chance.

6.7 Research Question Four - Redesigning the Diamond Model

Throughout the interviews, it became clear that the model did not provide an outline of how to assess competitiveness in a forward-looking manner. The elements themselves have proved to have relevance. With the inclusion of international demand into the demand element and the adjustment of chance to innovation/research and development/sustainability; a competitiveness model – which can be utilised not just as a measure but as a strategic plan for new businesses or the realignment of current businesses – will be advantageous in establishing a milieu of competitiveness.

Figure 34 : Adapted Porter Diamond



6.7.1 Base Ingredients

The research identified the need for there to be a balance between factor conditions and demand in order to create and introduce the correct products into the market place. As can be seen from Figure 34 above, the ideal location for a product, – whether beneficiated material, raw minerals, or widgets – is the area where demand and factor conditions overlay. The size of the factor conditions and the demand do not need to be equal as long as they intercept and overlap at some point.

Porter (2011) identified demand and factor conditions as part of the self-reinforcing diamond. He identified that all the elements need to be present in order for an industry to be competitive. Based on this research at a stage of equilibrium, these elements can be mutually reinforcing. However, without effective and available factor conditions, as well as demand, there is no foundation from which the elements can develop. Based on this, the principles of Porter's elements remain. However, in a forward-looking strategy, the importance and position has been amended in position and importance in the model.

6.7.2 Surrounding Environment

With a product that has sufficient and relevant factor conditions in place, in the case of this research beneficiated material, the level of competitiveness will need to be constantly increased. At this time competitiveness, within the relevant and supporting industry, is required to boost competitiveness that is suitable to the products/beneficiated material.

Within this level, the surrounding environment will also require for firms to become more robust with regard to strategies, visions and management. Competitiveness can improve through visionary leadership and clear direction, but similarly, this can fail for the opposite reasons. In the case of this research, it was identified that the nature of leadership varied at different stages of the business cycle, so the fluidity would need to be managed.

Porter (2011) identified these as two separate elements in his Diamond Model. They have been combined in this adapted model as they both provide the ability to drive the competitiveness of the products chosen in level one.

6.7.3 The Next Step

With a base product in place and demand and supply sustained through factor conditions able to support each other, this is the stage at which companies should be looking at

innovation, research and development and sustainability. It is difficult to approach this at an earlier stage, when the company is a fledgling, as funds are required from either outside investment or from the sales of the products for all of these.

Porter (2011) identified chance as an influencing factor in the Diamond Model. This adaption places chance in a more proactively forward-looking cycle and as a key element to the competitiveness process.

6.7.4 Enabling Environment

In this study, government involvement was identified as an important element in competitiveness and beneficiation. The premise of this feedback is for government to provide an enabling environment. The negativity as a result of a poor enabling environment and government's intention to over-regulate and put strategies into place that the current environment could not support, has been deleterious.

In this adapted model, government features as the last of the elements. Based on the results of this research, government should provide an enabling role for all elements, but only provide the wider support and not the detail spanning out from the middle of the model.

Porter (2011) reinforces the above, placing government as an influencing factor rather than a core element. The results of this research show that the role of government varies based on the environment and the position of the industry at that time. The position of government can be seen as core with the level of involvement fluctuating over time.

Chapter 7 - Conclusion

The purpose of the research was to establish the competitiveness of the mining industry in South Africa with reference to the beneficiation of minerals and its viability in the South African context. The competitiveness of the mining industry was analysed as beneficiation cannot be competitive if the inputs into it are not competitive.

In order to analyse the competitiveness of the mining industry, the Diamond Model, as designed by Michael Porter in his book, 'The Competitiveness of Nations', was used (Porter, 2011). The research conducted also tested the relevance of the model to a dynamic environment.

7.1 The Research

The research took the form of a qualitative study. This mode of analysis was selected as the South African government's industrialisation action plan was in an implementation and formalisation stage, making qualitative research ideal as there is more depth at an implementation stage (The Department of Trade and Industry, 2014). It was also a key part of the research to interrogate the Diamond Model developed by Porter (2011) as assess its applicability to a South African context.

In order to gain sufficient breadth of information, when utilising the Diamond Model, participants were chosen based on the judgement of the researcher. This method was pursued in order to provide significant coverage of the South African mining industry while providing representation from the various elements represented in the Diamond Model.

Interviews were conducted on a semi-structured basis and participants were able to speak freely as they were given the assurance of anonymity that no content would be attributed to any individual. The interviews, coupled with a short questionnaire, provided the data for analysis.

7.2 Main Findings

The study was based on beneficiation in the South African mining industry. In order to analyse this, a context was analysed on order to understand the environment surrounding why the mining industry is where it is at at the point in time when this research was conducted.

In order to do this, the literature and results included research on developing countries, resource endowment and comparative advantage, which contributes the current stage of development in. The literature and results then focused on the process of industrialisation, industrial policy and beneficiation, which is utilised as a development process through which to move a country to achieve a developed status.

Understanding the environment placed the competitive analysis into context and allowed greater depth in terms of exploring the Diamond Model, enhancing knowledge of competitive analysis and understanding the results of this research.

7.2.1 Research Question One

Is the South African mining industry sufficiently competitive to provide an enabling environment for successful mineral beneficiation based on the Diamond Model?

Based on the results of this research, within the parameter of elements identified in the Diamond Model, it was found that the South African mining industry was not sufficiently competitive to provide an enabling environment for mineral beneficiation.

7.2.2 Research Question Two

What elements are required to be sufficiently competitive to provide an enabling environment for successful mineral beneficiation utilising the Diamond Model?

The research found that the factor conditions of: firm strategy, structure and rivalry; supporting and related industries; government; and chance were elements that were required to be competitive going forward. Demand conditions were identified as an element that required change. Porter (2011) placed focus on home demand. On the

7.2.3 Research Question Three

Does the Porter Diamond Model accurately reflect competitiveness in the mining industry in a dynamic environment and is it relevant for future planning?

The results of the research demonstrated, through importance placed on the elements of the Diamond Model, that relevance can be inferred going forward. Significance in demand conditions was conditional on an amendment to greater weighting being placed on international demand.

7.2.4 Research Question Four

Is it possible to rework Porter's Diamond Model to suit a forward-looking strategy?

As established in research question three, the industry placed significance on the elements present in the Diamond Model. Based on the interviews, it was established that a new model would include the Diamond Model elements with adjustments to enable a more forward-looking alternative. In this regard, chance was amended to resilience; demand was weighted more heavily on international demand (away from just local demand); and the structure would require re-arranging. As a result, a new model was designed and presented in this research.

7.3 Significance

7.3.1 Business

Beneficiation is a significant issue in South Africa, with specific reference to South Africa's industrialisation drive. There is a degree of confusion as a result of the ambiguity of messages from the South African Government. The research was conducted with a significant number of business leaders and policy influencers from all sectors of the mining industry. This provides a strong representation of businesses' views pertaining to competitiveness within the mining industry. Factors, as outlined above, are required in order to progress in implementing a beneficiation strategy and a holistic view of the mining industry. Importantly, this provides feedback to companies represented in the various elements of the Diamond Model as to what the surrounding industry's perception of their current role is and their expected role going forward.

7.3.2 Academia

The exploratory nature of this research was not solely formulated according to questions and findings that were premised on the model and industry, but to applying it and interrogating the results.

In terms of the literature, there are a number of critics who disagree with Porter's model (Grant, 2011; Zhang & London, 2013) and have written publications, some of which have aligned with some of the results of this research, stating the shortcomings perceived as a result of this research.

The model that was developed as a result of this research was based on the elements that Porter delineated in his Diamond Model, while amending the design to reflect a forward-looking and dynamic perspective.

7.4 Research Limitations

- Throughout the interviews, ambiguity, as to what and where beneficiation began and ended in the mineral value chain, became evident. These different perceptions may have affected the frame of reference for participants in the study.
- Participants were selected to represent the mining and manufacturing industry. However, the absence of representation with regard to current government officials, over and above to the advisors used, may have had an effect on the results.
- Based on the structure of the questions, only four measures were used requiring either a positive or negative choice. The addition of a neutral option may change the results.
- When discussing and administering the questionnaire, it became apparent that discussions surrounding chance, and its pertinence to the mining industry, did not offer meaningful information. In addition, the majority of participants were not clear on what was required. In order to gain more detailed information, the reference to 'chance' was amended to 'resilience to external factors'.
- The research was conducted with input from leaders representing all relevant aspects of the research. Should the research be conducted with focus on only one element of the industry or affected party, the results are likely to change significantly. This research intended to survey the mining industry as a whole which required representation by leaders of all sections of the industry.
- Opinions from each section of the industry often differed, and, in many cases, significantly. At the time the interviews were conducted, there was significant publicity, coupled with industry and government dialogue, as to the viability and way forward with regard to beneficiation in South Africa. As such, should this research have been conducted at a different point in time (for example, when the issues may have been resolved or ways forward decided), the research may have displayed different results.
- The pure size of the mining industry makes it difficult to ensure that all parties were included. In order to achieve this, a greater sample size would be required. Despite the broad range and inclusion of some parties within this study, certain parties were excluded (such as, additional representation from supporting industries such as lawyers and greater representation from mining companies).

7.5 Future Study

- This research contained a number of highly knowledgeable people within, and influenced by, the mining industry. Qualitative research enabled the collection of current, point-in-time insight with regard to the mining industry's competitiveness. It is recommended that a quantitative study be done over a period of time utilising the same variables as embraced in this research. This would be able to provide further insight into the trends and the ability to statistically prove, disprove or amend the Diamond Model as well as the adapted model presented as a result of this research.
- At the time of this research, the economy was in a turbulent and weak position, following the global market crash in 2008. Thus, the research was conducted during a chance event. It would be beneficial for research to be conducted again in a stronger economy to identify the differences within the industry based on different economic conditions.
- It would also be beneficial to build on this research and analyse whether the levels of importance identified by industry and influencers going forward have influenced the industry in a positive way or have changed in importance. This would enable robustness testing on the model with the possibility of developing this research further or disproving it.
- It would be advantageous to build on this research to focus specifically on companies and influencers from each element of the model and to research each one in detail with relation to their specific feedback as it affects them personally. This could be executed rather than deriving feedback from all parties about the industry as whole, even if outside their specific discipline, regardless of influence from other elements.
- Research on another country or countries in the same stage of development, and with similar comparative reliance, not necessarily in natural resources, would provide greater insight into the validity of this analysis. This would offer a broader conception, providing findings of competitiveness outside the context of South Africa and varying comparative advantages which could, in turn, disprove or reinforce these findings. This could be done on a case study basis.

7.6 Conclusion

The intention of the research was to analyse the competitiveness of the South African mining industry in order to provide a competitive base and enabling environment for beneficiation to transpire. Driven by the need to industrialise in order to promote growth in the country and, by extension, increase employment; beneficiation was chosen as a potential flagship for growth. In order to fulfil this end, the current competitiveness status (and, indeed, requirements for competitiveness in the mining industry going forward) was established. The use of the Diamond Model afforded the researcher a foundation and structure, facilitating interrogation and analysis of a dynamic and developing environment. The model highlighted potential applications for forward-looking analysis and strategy development. It is believed that the results of this research provide insight that is valuable in both business and academic environments

References

- Alwang, J., & Siegel, P. (1994). Portfolio models and planning for export diversification: Malawi, Tanzania and Zimbabwe. *The Journal of Development Studies*, 30(2), 405-422.
- Amurgo-Pacheco, A. (2008). *Patterns of export diversification in developing countries* (Vol. 4473): World Bank Publications.
- Bello, O. (2014, 2014). South Africa: closer government and industry engagement the key to beneficiation. Retrieved 12/08, 2014, from <http://www.saiia.org.za/opinion-analysis/south-africa-closer-government-and-industry-engagement-the-key-to-beneficiation>
- Bothole, T., Asafu-Adjaye, J., & Carmignani, F. (2012). Natural resource institutions and tax revenue mobilisation in Su-Sahara Africa. *South African Journal of Economics*, 80(2), 135-156. doi: 10.1111/j.1813-6982.2011.01305.x
- Botta, A. (2010). Economic development, structural change and natural resource booms : a structuralist perspective. *Metroeconomica*, 61(3), 510-539. doi: 10.1111/j.1467-999X.2009.04077.x
- Botta, A. (2010). Economic development, structural change and natural resource booms: a structuralist perspective. *Metroeconomica*, 61(3), 510-539. doi: 10.1111/j.1467-999X.2009.04077.x
- Bournakis, I. (2014). Costs, knowledge and market structure: understanding the puzzle of international competitiveness with Greek export data. *International Review of Applied Economics*, 28(2), 240-269. doi: 10.1080/02692171.2013.858669
- Cadot, O., Carrère, C., & Strauss-Kahn, V. (2013). Trade diversification, income, and growth: what do we know? *Journal of Economic Surveys*, 27(4), 790-812. doi: 10.1111/j.1467-6419.2011.00719.x
- Cawood, F. T. (2011). Threats to the South African minerals sector : an independent view on the investment environment for mining. *Journal of the Southern African Institute of Mining and Metallurgy*, 111, 469-474.

- Cawood, F. T., & Oshokoya, O. P. (2013). Considerations for the resource nationalism debate: a plausible way forward for mining taxation in South Africa. *Journal of the Southern African Institute of Mining and Metallurgy*, 113, 53-59.
- Chandra, R. (2004). *Globalisation, liberalisation, privatisation, and Indian polity: trade and commerce* (Vol. 5): Gyan Publishing House.
- Chatain, O. (2013). How do strategic factor markets respond to rivalry in the product market? *Strategic Management Journal*. doi: 10.1002/smj.2188
- Coxhead, I., & Jayasuriya, S. (2010). China, India and the commodity boom: economic and environmental implications for low-income countries. *World Economy*, 33(4), 525-551. doi: 10.1111/j.1467-9701.2009.01232.x
- Davis, G., & Vásquez Cordano, A. (2013). International trade in mining products. *Journal of Economic Surveys*, 27(1), 74-97. doi: 10.1111/j.1467-6419.2011.00695.x
- Davis, G. A., & Vásquez Cordano, A. L. (2013). International trade in mining products. *Journal of Economic Surveys*, 27(1), 74-97. doi: 10.1111/j.1467-6419.2011.00695.x
- Deardorff, A. (2014). Local comparative advantage: trade costs and the pattern of trade. *International Journal of Economic Theory*, 10(1), 9-35. doi: 10.1111/ijet.12025
- Dennis, A., & Shepherd, B. (2011). Trade facilitation and export diversification. *The World Economy*, 34(1), 101-122. doi: 10.1111/j.1467-9701.2010.01303.x
- Department of Minerals Resources. (2011). *A beneficiation strategy for the minerals industry of South Africa*. South Africa.
- Department of Trade and Industry. (2007). *National industrial policy framework*. South Africa.
- Desai, V., & Potter, R. (2013). *The companion to development studies*: Routledge.
- Dickson, J. (2014). SADC summit emphasises role of domestic beneficiation for regional growth. Retrieved 13/08, 2014, from <http://www.indmin.com/Article/3372356/SADC-summit-emphasises-role-of-domestic-beneficiation-for-regional-growth.html?LS=EMS1061541>

- Economic Development Department. (2011). *The new growth path: framework*. South Africa.
- Frankel, J. A. (2010). The natural resource curse: a survey: National Bureau of Economic Research.
- Friese, S. (2014). *Qualitative data analysis with ATLAS.ti* (K. Metzler Ed. 2 ed.): Sage Publications, Inc.
- Galletta, A. (2013). *Mastering the semi-structured interview and beyond* (M. Fine & J. Marecek Eds.). United States of America: New York University Press.
- Gan, Y., Zhang, T., Liang, S., Zhao, Z., & Li, N. (2013). How to deal with resource productivity. *Journal of Industrial Ecology*, 17(3), 440-451. doi: 10.1111/j.1530-9290.2012.00547.x
- Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), 78-104.
- Gore, C. (2010). The global recession of 2009 in a long-term development perspective. *Journal of International Development*, 22(6), 714-738. doi: 10.1002/jid.1725
- Grant, R. (2011). *Competition, competitive advantage, and clusters : the ideas of Michael Porter* (R. Huggins & H. Izuski Eds.). United States: Oxford University Press.
- Greve, N. (2014). Local beneficiation industry will create global competitive advantage – Davies. Retrieved 21-08, 2014, from <http://www.miningweekly.com/article/local-beneficiation-industry-will-create-global-competitive-advantage-davies-2014-07-24>
- Harding, J. (2013). *Qualitative data analysis from start to finish* (K. Metzler Ed.): Sage Publications, Inc.
- Hausmann, R., Rodrik, D., & Sabel, C. (2008). *Reconfiguring industrial policy: a framework with an application to South Africa*: Center for International Development at Harvard University.
- Hay, C. (2012). The 'dangerous obsession' with cost competitiveness ... and the not so dangerous obsession with competitiveness. *Cambridge Journal of Economics*, 36(2), 463-479.

- Huberman, A., Miles, M., & Saldana, J. (2014). *Qualitative data analysis, a methods source book*. United States of America: Sage Publications Inc.
- Joffe, A. (1995). *Improving manufacturing performance in South Africa: the report of the industrial strategy project*. IDRC.
- Jourdan, P. (2013). Toward a resource-based african industrialisation strategy. *The Industrial Policy Revolution II: Africa in the Twenty-First Century*, 364.
- Kellman, M., & Shachmurove, Y. (2011). Diversification and specialisation paradox in developing country trade. *Review of Development Economics*, 15(2), 212-222. doi: 10.1111/j.1467-9361.2011.00603.x
- Ketels, C. (2011). *Competition, competitive advantage, and clusters : the ideas of Michael Porter* (R. Huggins & H. Izuski Eds.). United States: Oxford University Press.
- Kohler, M. (2014). Differential electricity pricing and energy efficiency in South Africa. *Energy*, 64, 524-532.
- Lim, J., & Saborowski, C. (2012). Export diversification in a transitioning economy. *Economics of Transition*, 20(2), 339-367. doi: 10.1111/j.1468-0351.2011.00430.x
- Lin, J. (2012a). From flying geese to leading dragons: new opportunities and strategies for structural transformation in developing countries. *Global Policy*, 3(4), 397-409. doi: 10.1111/j.1758-5899.2012.00172.x
- Lin, J. (2012b). *New structural economics : a framework for rethinking development policy*. Washington DC: The World Bank.
- Lin, J. (2013). New structural economics: the third wave of development thinking. *Asian-Pacific Economic Literature*, 27(2), 1-13. doi: 10.1111/apel.12044
- Lin, J., Monga, C., te Velde, D., Tendulkar, S., Amsden, A., Amoako, K., . . . Lim, W. (2011). DPR Debate: Growth identification and facilitation: the role of the state in the dynamics of structural change. *Development Policy Review*, 29(3), 259-310. doi: 10.1111/j.1467-7679.2011.00534.x
- Maneschi, A. (1998). *Comparative advantage in international trade: A historical perspective*: Edward Elgar Publishing.

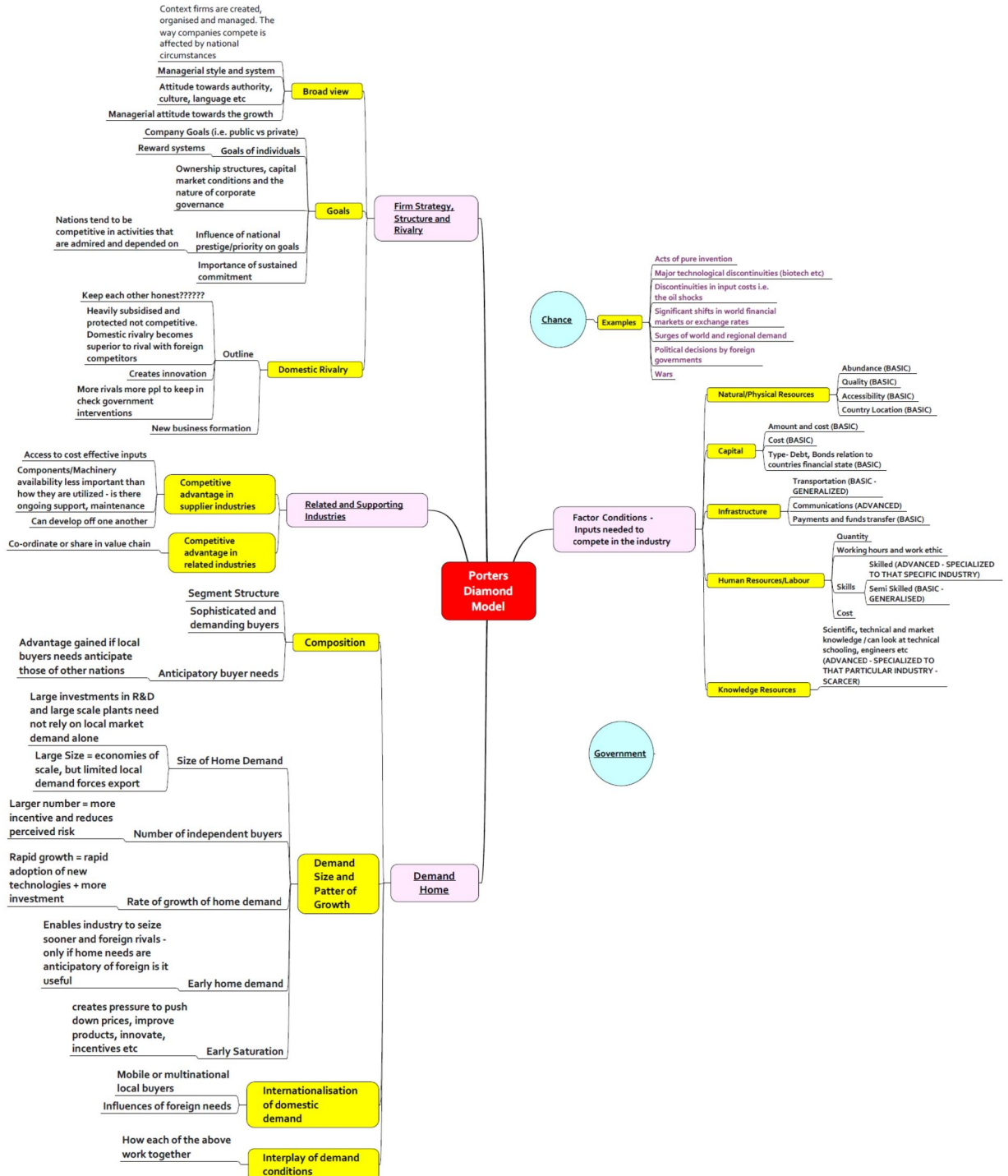
- Mavrotas, G., Murshed, S., & Torres, S. (2011). Natural resource dependence and economic performance in the 1970–2000 period. *Review of Development Economics*, 15(1), 124-138. doi: 10.1111/j.1467-9361.2010.00597.x
- McFerson, H. M. (2010). Extractive industries and African democracy: can the “resource curse” be exorcised? *International Studies Perspectives*, 11(4), 335-353. doi: 10.1111/j.1528-3585.2010.00410.x
- McKay, D. (2014). Mines law recall 'stopped SA going backward'. Retrieved 21/08, 2014, from http://www.miningmx.com/page/news/markets/1644540-Mines-law-recall-stopped-SA-going-backward#.U_XodfmSwud
- Moeti, K. (2013). The role of government in ensuring an affordable supply of electricity in South Africa: challenges and future prospects. *Journal of Public Administration*, 48(2), 334-341.
- Mold, A. (2012). Will it all end in tears? Infrastructure spending and African development in historical perspective. *Journal of International Development*, 24(2), 237-254. doi: 10.1002/jid.2818
- Moreno-Brid, J. C. (2013). Industrial Policy: A Missing Link in Mexico's Quest for Export-led Growth. *Latin American Policy*, 4(2), 216-237. doi: 10.1111/lamp.12015
- Morris, M., Kaplinsky, R., & Kaplan, D. (2012). “One thing leads to another”—commodities, linkages and industrial development. *Resources Policy*, 37(4), 408-416. doi: <http://dx.doi.org/10.1016/j.resourpol.2012.06.008>
- Morrissey, O., & Filatotchev, I. (2000). Globalisation and trade: the implications for exports from marginalised economies. *Journal of Development Studies*, 37(2), 1-12.
- Morrissey, O., & Filatotchev, I. (2001). *Globalisation and trade: implications for exports from marginalised economies* (Vol. 3): Psychology Press.
- Naudé, W., Bosker, M., & Matthee, M. (2010). Export specialisation and local economic growth. *World Economy*, 33(4), 552-572. doi: 10.1111/j.1467-9701.2009.01239.x
- Patrick, G. (2014). Precious metals 2013. *Journal of the Southern African Institute of Mining and Metallurgy*, 114.

- Pauwelyn, J. (2013). The end of differential treatment for developing countries? Lessons from the trade and climate change regimes. *Review of European, Comparative & International Environmental Law*, 22(1), 29-41. doi: 10.1111/reel.12017
- Porter, M. (2011). *The competitive advantage of nations* (First Free Press ed.). New York.
- Rodrik, D. (2008). Normalising industrial policy. Retrieved 16/08, 2014, from <http://213.154.74.164/invenio/record/18465/files/rodrikter.pdf>
- Rogers, M. (2003). A survey of economic growth. *Economic Record*, 79(244), 112-135. doi: 10.1111/1475-4932.00082
- Rossouw, M., & Baxter, R. (2011). Subject concepts and issue outline. *Journal of the Southern African Institute of Mining and Metallurgy*, 111(7), 511-516.
- Rossouw, M., & Baxter, R. (2011). Subject concepts and issue outline. *Journal of the Southern African Institute of Mining and Metallurgy*, 111, 511-516.
- Ruffin, R. (2003). International trade under oligopoly conditions. *Review of International Economics*, 11(4), 577-587. doi: 10.1111/1467-9396.00404
- Sachs, J., & Warner, A. (2001). The curse of natural resources. *European economic review*, 45(4), 827-838.
- Saunders, M., & Lewis, P. (2012). *Doing research in business and management*. England: Pearson Education Limited.
- Shikher, S. (2013). Determinants of trade and specialisation in the organisation for economic co-operation and development countries. *Economic Inquiry*, 51(1), 138-158. doi: 10.1111/j.1465-7295.2012.00465.x
- Smet, K. (2013). Trade-induced unemployment: the case of post-apartheid South Africa. *South African Journal of Economics*, 81(2), 240-259. doi: 10.1111/saje.12004
- South Africa: investor's handbook 2013/2014. (2014). South Africa: Deloitte & Touche.
- South Africa: power outage. (2008). *Africa Research Bulletin: Economic, Financial and Technical Series*, 45(1), 17687A-17690C. doi: 10.1111/j.1467-6346.2008.01421.x

- Szirmai, A. (2012). Industrialisation as an engine of growth in developing countries, 1950–2005. *Structural Change and Economic Dynamics*, 23(4), 406-420. doi: <http://dx.doi.org/10.1016/j.strueco.2011.01.005>
- The Department of Trade and Industry. (2014). *Industrial policy action plan*. (97/2014). South Africa.
- The World Bank. (2012). What is a developing country. Retrieved 16/06, 2014, from <http://go.worldbank.org/N174APV2T0>
- Thomashausen, A. (2011). Export taxes as a means to protect South Africa's minerals beneficiation strategy. *SA Mercantile Law Journal= SA Tydskrif vir Handelsreg*, 23(3), 407-419.
- Tomaru, Y., & Nakamura, Y. (2012). Inter-regional mixed oligopoly with a vertical structure of government *. *Australian Economic Papers*, 51(1), 38-54. doi: 10.1111/j.1467-8454.2012.00421.x
- Tucker, C., & Sibisi, S. (2014, 12-05-2014). Mineral and Petroleum Resources Development Ammendment Bill 2013 approved. *International Law Office*. Retrieved from [http://www.bowman.co.za/FileBrowser/ArticleDocuments/Mineral and Petroleum Resources Development Ammendment Bill 2013 approved.pdf](http://www.bowman.co.za/FileBrowser/ArticleDocuments/Mineral_and_Petroleum_Resources_Development_Amendment_Bill_2013_approved.pdf)
- United Nations Economic Commission for Africa. (2013). Making the most of africa's commodities: Industrialising for growth, jobs and economic transformation *Economic Report on Africa*. Addis Ababa, Ethiopia.
- Vera, L. (2013). Some useful concepts for development economics in the tradition of Latin American structuralism. *American Journal of Economics and Sociology*, 72(4), 917-948. doi: 10.1111/ajes.12027
- Vietor, R. (2007). *How countries compete: strategy, structure and government in the global economy*. United States of America: Harvard Business School Press.
- Weldemicael, E. (2014). Technology, trade costs and export sophistication. *The World Economy*, 37(1), 14-41. doi: 10.1111/twec.12071

Zhang, P., & London, K. (2013). Towards an internationalised sustainable industrial competitiveness model. *Competitiveness Review*, 23(2), 95-113. doi: 10.1108/10595421311305325

Addendum A – Interview prompt



Addendum B – Questionnaire

1. **Factor Conditions**

The nation's position in factors of production, such as human resources, physical resources, knowledge resources, capital resources and infrastructure are assessed here. Specialised resources are often specific to an industry and important for its competitiveness.^[2] Specific resources can be created to compensate for factor disadvantages.

What is the current status of the factor conditions in South Africa with reference to beneficiation and competitiveness in the mining industry?

Poor	Fair	Good	Very Good
------	------	------	-----------

Why?

What level of importance are factor conditions in creating a competitive environment to enable successful beneficiation

Not important	Somewhat important	Important	Very important
---------------	--------------------	-----------	----------------

Why?

2. Firm Strategy, Structure and Rivalry

The way in which companies are created, set goals and are managed is important for success, but the presence of intense rivalry in the home base is also important, as it creates pressure to innovate in order to upgrade

What is the current status of firm strategy, structure and rivalry in South Africa with reference to beneficiation and competitiveness in the mining industry?

Poor	Fair	Good	Very Good
------	------	------	-----------

Why?

What level of importance is firm strategy, structure and rivalry in creating a competitive environment to enable successful beneficiation?

Not important	Somewhat important	Important	Very important
---------------	--------------------	-----------	----------------

Why?

3. Demand Conditions - Home

The home market can help companies create a competitive advantage when sophisticated home market buyers pressure firms to innovate faster and to create more advanced products than those of competitors. The composition of home demand perceives, interprets, and responds to buyer needs. This gives a clearer and earlier picture of buyer needs than foreign firms have. It also results in companies pressuring each other to innovate.

What is the current status of home demand conditions in South Africa with reference to beneficiation and competitiveness in the mining industry?

Poor	Fair	Good	Very Good
------	------	------	-----------

Why?

What level of importance do home demand conditions have in creating a competitive environment to enable successful beneficiation?

Not important	Somewhat important	Important	Very important
---------------	--------------------	-----------	----------------

Why?

4. Related and supporting industries

These can produce inputs that are important for innovation and internationalisation. These industries provide cost-effective inputs, but they also participate in the upgrading process, thus stimulating other companies in the chain to innovate the presence or absence in the nation of supplier and related industries that are internationally competitive.

What is the current status of related and supporting industries in South Africa with reference to beneficiation and competitiveness in the mining industry?

Poor	Fair	Good	Very Good
------	------	------	-----------

Why?

What level of importance do home demand conditions have in creating a competitive environment to enable successful beneficiation?

Not important	Somewhat important	Important	Very important
---------------	--------------------	-----------	----------------

Why?

5. Government

Government can influence each of the above four determinants of competitiveness. Clearly, government can influence the supply conditions of key production factors, demand conditions in the home market, and competition between firms. Government interventions can occur at local, regional, national or supranational level.

What is the current status of government involvement in South Africa with reference to beneficiation and competitiveness in the mining industry?

Poor	Fair	Good	Very Good
------	------	------	-----------

Why?

What level of importance would you attribute to government involvement in creating a competitive environment to enable successful beneficiation?

Not important	Somewhat important	Important	Very important
---------------	--------------------	-----------	----------------

Why ?

6. Chance

Chance refers to events that have nothing to do with circumstances in a nation and are often outside the control of firms and often also national government – they can change the rules of the game.

They are important because they create discontinuities in which some gain competitive positions and some lose these.

What is the current influence of chance events in South Africa with reference to beneficiation and competitiveness in the mining industry?

Poor	Fair	Good	Very Good
------	------	------	-----------

Why?

What level of importance would you place on elements of chance in creating a competitive environment to enable successful beneficiation?

Not important	Somewhat important	Important	Very important
---------------	--------------------	-----------	----------------

Why?

Appendix C

#CHANCE	Currency	Factor-Private-Logistics-Inhibiting	Manufacturing
#DEMAND	Demand-Home-Enabling	Factor-Skills-Enabling	Market Conditions - Enabling
#FACTOR	Demand-Home-Inhibiting	Factor-Skills-Inhibiting	Market Conditions - Inhibiting
#FIRM STRATEGY	Demand-Home-Neutral	Factor-Water	Minerals
#GOVERNMENT	Demand International-Inhibiting	Finance	Mining
#RELATED AND SUPPORTING	Demand International-Neutral	Firm Strategy-Rivalry-Management Change	Negative Economics
Anti-Competitiveness	Demand International - Enabling	Firm Strategy-Rivalry-Management Negative	Oligopoly
BBBEE	Economics	Firm Strategy-Rivalry-Management Positive	Parity Pricing
Beneficiate - Suggestions	Employment	Firm Strategy-Rivalry-Stable	Pigment and Titanium - No
Beneficiation	Enabling Environment	Firm Strategy-Rivalry-Upset	Pigment and Titanium - yes
Beneficiation - Short Term - Negative	Energy Commodities - No	Globalisation	Platinum
Beneficiation - Long Term - Positive	Energy Commodities - Yes	Gov Docs - No	Policies - Negative
Beneficiation - Selected Products	Factor-Education-Enabling	Gov Docs - Yes	Policies - Positive
Beneficiation - Short Term - Negative	Factor-Education-Inhibiting	Government-Business Trust-Negative	Porter
Beneficiation - Short Term - Positive	Factor-Finance-Enabling	Government-Business Trust-Positive	Positive Economics
Beneficiation Solution - No	Factor-Finance - Inhibiting	Government-ease of business-enabling	PPP
Beneficiation Solution - Yes	Factor-Government-Logistics-Enabling	Government-ease of business-Inhibiting	Productivity
Catalytic Converters - No	Factor-Government-Logistics-Inhibiting	Government-Legislation-Policy-Strategy	Related and Supporting-Enabling
Catalytic Converters - Yes	Factor-Infrastructure-Bad	Government-Level of Intervention-High	Related and Supporting-Inhibiting
Chance-Innovation	Factor-Infrastructure-Good	Government - Ambiguous	Related and Supporting-Neutral
Chance-Resilience	Factor-Knowledge Skills-Enabling	Government - Clear	Requirements for Success
China	Factor-Knowledge Skills-Inhibiting	Government - Politics	Restrained Environment
Chrome - Beneficiate	Factor-Labour-Enabling	Government Value Add	Risk
Chrome - Do not Beneficiate	Factor-Labour-Inhibiting	High Value Material	Shipping
Commodity-Boom-Advantage Missed	Factor-Location-Enabling	Industrialisation	Steel - No
Commodity-Boom-Advantage Utilised	Factor-Location-Inhibiting	Industry	Steel - Yes
Commodity-Financial Crash-2008	Factor-Power-Enabling	Innovation	Value Chain
Comparative Advantage-Natural Resources	Factor-Power-Inhibiting	Jewellery	Volatility
Competitiveness	Factor-Private-Logistics-Enabling	Low Value Material	